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THE PAPER INDUSTRY

APRIL, 1935
Vol. 17—No. 1

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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Making the Equipment Installation

WHEN new machinery is purchased for the accomplishment of a particular purpose, it is essential that the equipment be installed properly. In some cases, this matter of proper installation is so important that the machinery is erected under the supervision of an erecting engineer from the machinery manufacturer's organization. To insure correct installation, the machinery manufacturer might even go so far as to furnish the entire erecting crew.

Most equipment purchases, however, are of such character that the expense involved in utilizing the services of an equipment manufacturer's erecting crew or only an erecting engineer would be too large for the total investment being made. It is, therefore, up to the purchaser's engineering and millwrighting departments to take full responsibility for erecting most of the machinery purchased by their individual organizations.

To reduce the chance of making an error in the erection of any new equipment by the staff responsible for this work in the purchaser's plant, the equipment manufacturer commonly furnishes complete instructions for doing the job. It is taken for granted by the manufacturer that these instructions often attached directly and conspicuously to the machine being installed will be scrutinized and that they will be followed in so far as possible by the individual in charge of the erecting force.

Many times, however, these instructions do not receive the consideration that is due them. Sometimes the instructions are not even read. If they are contained within an envelope, the envelope is torn from the machine and thrown away without removing the contents and the machine installed along lines dictated by the individual in charge.

Perhaps, in numerous instances, such procedure has worked no hardship on the mill making the purchase or on the equipment manufacturer supplying it. The erecting force in such instances was sufficiently skilled in its work as well as in the requirements of the individual machine to know how to install it. Yet cases are known where failure to read the instructions supplied by the manufacturer has caused much unnecessary expense to both purchaser and seller alike.

The purchaser not only is delayed in getting satisfactory performance from the machine, but it is likely he may become unfairly prejudiced against it. The manufacturer may lose a customer without ever having the opportunity of correcting a situation for which he was in no way responsible or be put to unnecessary expense in doing so because of the careless practices of those responsible for making the machinery installation.

To avoid unsavory situations of this kind in your plant, if it is not already being done, might it be suggested that instructions supplied by any equipment manufacturer be carefully reviewed by the installation engineer in charge prior to making any actual installation even though he may be thoroughly conversant with the details involved.

+ EDITORIAL +

Gangway for Prosperity

IN A RECENT report on the present business upturn, Dun & Bradstreet summarized the situation as "the soundest revival since the depression low of 1932." This is the most significant announcement since the battle with depression began. There is no political ballyhoo in it. It comes from the foremost authority on trends of the business cycle.

What it means is that the depression is over and at last we are on the way back to economic industrial recovery.

It is confirmed by reports coming in of expanded business done during the past three months of the current year. It points to a continuance of expansion throughout the remaining months of 1935.

The wise business men know that Dun & Bradstreet's report is true. They are already preparing to take advantage of the information and favorable conditions in order to ride "the soundest revival of business" on the upward swing to returning prosperity. And why not?

All the natural economic forces are working tirelessly for the inevitable upturn of the business cycle which always has, and always will, follow the downturn of the business curve.

In addition, we have today for the first time in our economic history a government deliberately committed to an inflationary program of farflung co-operation with the natural forces to push industrial recovery forward and upward.

This creates a combination of powerful, irresistible economic and political forces, the like of which no previous deflation era ever had behind it. To what new high levels the returning upward swing may take us, no one in business today can say. That there will be new high levels reached, admits of no debate.

Confident business men are preparing for the upward swing. The sold-out inventories of every kind of goods are being covered by placement of urgent orders to ship. Hand-to-mouth buying has overstayed its market control. Consumers need supplies; retailers need merchandise; wholesalers need stocks; factories need equipment; mills need raw materials. And the hugest supply of cash and credit is piled up ready to go back to work at the cheapest interest wage.

"The soundest revival of business" is already in operation. Gangway for prosperity!

New Uses for Paper

PROGRESSIVE manufacturers in the paper industry have been active within recent years in pioneering new uses for many grades of paper. Because of their efforts, paper is being utilized today for purposes which were unheard of only a few years ago.

Who would have thought twenty-five years ago that paper parchment would be extensively used for food preservation and in cooking; that mulch paper would be spread over many acres of farm land to increase crop productivity; and that facial and other sanitary tissues would be so readily accepted?

There are other important uses of paper that have been developed within recent years. Some mills, in fact, are continually giving consideration to the production of new specialties, and no doubt there are many uses for which paper might be satisfactorily adapted that have never yet been conceived.

It is highly possible that some of these uses will filter into the industry from the outside, in many cases being conceived by individuals who have been associated with the industry only as consumers.

One advertising agency executive, for example, has suggested recently the possibility of a paper sealing ring for Mason and Lightning jars. He points out that home made fruit preserves, home canned peaches and the like sometimes take on an unpleasant odor, taste and color from the reaction between the contents of the jars and the rubber sealing rings; and wonders if it would be possible for some manufacturer to develop the paper sealing ring.

Then again, an engineer not associated with the pulp and paper industry wonders if a suitable waterproof paper could be utilized for binding rolls of paper to permit roll shipment in open cars. It is his opinion that paper shipped in such a manner could be handled more economically than by present methods.

He further contends that the promotion of this idea by paper manufacturers, where feasible within the industry, would make it possible to gradually extend the use of paper to the wrapping and shipment of other materials in open cars that are not now shipped that way.

Have you ever considered these two possible uses for paper? If not, they should not be dismissed from thought lightly. In them may be the chrysalis of an idea which when unfolded would reveal an actual opportunity or unveil the means of stimulating activity in other directions.

The Cleveland Tractor Company says—

"WE FIND DAYTON V-BELT DRIVES MUCH MORE EFFICIENT"

● Today Dayton V-Belt Drives are used on all types of machines in the highly efficient plant of the Cleveland Tractor Company. In speaking about these drives, Andrew Fussner, the Master Mechanic, says: "In addition to greater efficiency, these drives have effected real power savings. Previously power was supplied to run all machines in a department or building when, frequently, only a few machines were being used. Further, we find that maintenance costs are much lower—the plant is cleaner and safer and much valuable floor space has been saved by using these individual drives. Thus, our total savings in a year are very much worth while."

Engineers and Production Managers in thousands of plants of all kinds have secured similar results by installing Dayton V-Belt Drives. Here are some of the reasons why. Dayton V-Belts are "built-to-bend." Their exclusive and patented construction makes them more flexible. They are die-cut, not molded. They accurately fit the grooves of all standard pulleys. Their rigid crosswise construction prevents distortion—there is no slipping or weaving. This means smoother running . . . positive speed . . . less tension . . . less wear on bearings. Machines last longer and there's practically no maintenance cost.

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● *No other V-Belt combines such positive crosswise rigidity with such extreme flexibility.*

And there's much more to tell. Let us give you all the facts about the many exclusive advantages of Dayton V-Belt Drives. Wire or write today.

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CURRENT THOUGHT

Dust - Dust - DUST !

By WILLIAM SIBLEY

◆ IN SOME OF the middle western states they are reaping the harvest of reckless plowing and hasty seeding. And the harvest is one of *dust.*

Spurred by a seemingly exhaustless market the farmers of Kansas, Colorado, Nebraska and the Dakotas, spent the War and Post-War period pulverizing the knitted earth with sub-soil plows, denuding it of binding vegetation, and forcing it to yield a succession of crops; each of which was disced back into the ground for further and deeper plowing and pulverizing.

For the past two years (ironically enough, the years of greatest need) these western farmers have been forced to stand impotently by and watch their precious soil blown away by unknown numbers of tons. Utterly powerless to do anything about it they have witnessed their neighbor's soil drift in dunes so high as to render their own farms untillable for decades to come.

Futilely the city dwellers try to shield themselves from this fearful plague. But there is no escape; no shelter. Windows are clamped shut; damp rags stuffed in cracks; wet blankets hung over doors. But even so, dust is on the tongue; it irritates the eyes, stings the throat, clogs the lungs. It invades surgical wards and forces the postponement of operations. It obscures the lights in classrooms and dismisses school. It sifts its way into delicate fabrics and ruins costly pianos. It obscures automobile headlights and stops traffic. Flour cannot be milled because dust finds its way into the finished product. Trains are halted. Only tinned foods are safe to eat. Physicians fear an epidemic of consumption.

The harvest of War-time haste is changing the Gold of the West to dross. Hysterical haste has desertized the most fertile of areas. Precipitant action has resulted in the precipitation of dust—devastating dust.

◆ THROUGHOUT THE EAST there is another dust storm. A storm of *depression dust.* A storm of mental, political, economic dust; equally devastating. In our haste to solve the problems of the moment we are plowing recklessly; seeding wastefully; denuding our social structure of protective legislation. The hysteria of the moment is permitting the rise of a flock of radio demagogues who dogmatically advocate sheer larceny in legalized form. Modern Savonarolas equip their pulpits with microphones, attached to which are net-works of wires that spiderweb the nation. Buffoons gain national prominence and political prestige by fist fights in the Senate chambers and by libelous broadcasts. Millions of people sign the petition of a "Pied Piper" who promises to donate 40 per cent of the national income to 9 per cent of the population.

In this economic and political dust storm we find the most hackneyed phrase in Washington to be "a billion dollars." Just a few weeks ago, Dr. Townsend struck a new and higher note by speaking of trillions. Time and again congressmen have proposed spending amounts of money greater by far than the entire wealth of the states they represent. The imaginings of Amos and Andy are solid philosophy in comparison with the actualities of our Munchausen representatives.

Dust! Confusing, irritating, blinding dust.

◆ DURING THE TOO-LONG PERIOD required to teach an army general that he couldn't regiment and drill industrial companies like military companies, business confidence was buried under drifting, shifting, conflicting dunes of dust. Even though we locked our ledgers in vaults and stowed our securities in safety deposit boxes, this confidence destroying dust sifted in and soiled the balances; kept the ledger ink a reddish hue.

Futilely the industrialists try to shield themselves from this fearful plague. But there is no escape; no shelter. The dust invades the architect's offices and forces the postponement of building operations. It obscures the possibility of profit in business, and dismisses production. Traffic is stopped; mills are shut down; trains are halted. Economists fear an epidemic of communism.

The harvest of depression haste is chasing the gold of business prosperity into permanent hiding. In our hysterical hurry to escape depression we have covered ourselves with the dust kicked up by false prophets, heretics and schismatics. Dust that chokes confidence; soils ideas; confuses thought; stings the mind and clogs the bellows of production.

Will we weather this political dust storm? Probably. Just as Kansas will doubtless remain a factor in agricultural production for centuries to come.

But it is well to remember that only as far back as 1930, Hitler was as much of a buffoon to literate Germany as Huey Long is to us today. It is well to recall that although the authorities silenced Savonarola by public hanging and burning, the ideas he instilled helped bring to a speedy end the Italian Renaissance. It should not be overlooked that out of the drifting dunes of political dust there invariably grows and flourishes world-wide preparation for war.

It is well never to forget the fact that out of the whirling confusion of political dust there frequently arises a single-handed dictator . . . and that single-handed dictators are always high-handed.

THE PAPER INDUSTRY
A MONTHLY EDUCATIONAL JOURNAL

Research and Responsibility

ARTHUR B. GREEN, Management Engineer

THROUGH research, formal and informal, one may experiment and practice to learn first what others already know, but to know it better than they; then to extend this collective knowledge into the possibilities. True research is put into service by directing such work before it starts, not by mumbling about it afterward.

Formal paper mill laboratories in this country had a beginning about 1902. Since that time, the industry has absorbed a little army of some 2,500 laboratory-trained men, largely chemists, many with graduate degrees awarded here and abroad. That does not count engineers from the power houses and repair departments, and from outside practice, who have worked their way into capacities concerned with making paper and who have brought with them an engineer's point of view.

This same period has witnessed the culmination of other progressive measures that have been at work in the industry for a longer time. For example, the typewriter and its cousin the accounting machine have emancipated the business man from long-hand drudgery, have given him a little more freedom, and have brightened up his old matched pine office. Again, power on rail, on wagon roads and in ships took his goods out of jobbers' warehouses by moving them faster into consumption, and also placed upon the shoulders of the manufacturer the burden of service to the trade that previously had belonged to his merchants. The telephone and telegraph added their pressure to the forces, bending the paper manufacturer away from his mill toward the field of sales and sales promotion, for with their aid he could be away among his customers and still feel in touch with the plant.

And, finally, the corporate structure with its scattered ownership, diffused responsibility, pieces of engraved paper indicating various forms of ownership, claim, or indebtedness—those combinations of more or less unrelated mills held under one financial control seeking markets for pyramided securities with fluctuating prices for the sake of speculation—all distracted the attention of the business man from what Henry Ford insists is his real job.

When the technician came out of his course of training and presented himself at the mill for a job, he was almost too late. The business man was away—away physically and away mentally. He was engrossed in the hopeless task of keeping surplus up and assets liquid; his eyes were on the books; his thoughts dwelt on trade and speculation with perhaps a dash of politics; his feet trod polished terrazzo and Persian rugs instead of the wet mill floor. Surrounded by evidences of wealth, he had withdrawn from its sources. Sensing remote power over a wide domain, he had taken his own hand off the controls where power is generated, for he was a stranger to the men and women who did his work. Judging all his operations by the financial yardstick, he had come to regard himself as a guardian, charged primarily like a banker with the safety of funds, protecting his business from risk, keeping it from change lest a change prove unwise. He had forgotten his prime assets—the intelligence, energy, skill and loyalty of the men and women who did the work.

In the simpler days of his grandfather, it was the owner, the papermaker, who was seen on the mill floor about the heavy business of producing, his sleeves rolled up, the hair of his forearm tangled with the fiber of his trade. Under those conditions, it took a round century to develop such processes as beating with the Hollander, machining with the Fourdrinier, refining with the Jordan; but they were finally developed. Under the modern methods, nothing of equal consequence has yet occurred. Should the grandfather come back to look over his

papermaking descendants, he might be excused if he threw just a bit of a chest, especially in consideration of these thirty-odd years of deliberate and premeditating technicians.

Perhaps the grandfather would find the technician himself interesting. When a problem is followed rigorously according to sound engineering principles, it sometimes develops hard or expensive facts; so that the better the technician, the greater is his head-on collision with the guardian of the company's funds. The guardian seldom likes to look new facts full in the face. He has an inbred fear of the possible cost. So the technician, putting discretion ahead of valor, acquires a self-preservative skill in bending his reports just a bit toward the answer he knows is wanted. Between the fear on the one side and the fear on the other, the problem finally drops out of sight and business goes on as usual.

A working organization split into departments would interest the old man too, especially should he suspect (as he might, on looking closely) that departmental distinction had become more important than the people comprising the departments. He, himself, might expect in departments a good plan for getting work done, but when it becomes more important to keep from stepping over departmental boundaries than it is to accomplish an end, he might wonder. He might wonder at seeing the technician shut up in a laboratory away from his job, and not using the laboratory as a tool for a purpose, to be picked up when needed and then laid aside again. His habit in his day was to gauge all things by practical value.

But what would he consider practical? Much of his working day used to be spent coaching. It was a day of apprenticeship. He had served his own time in his youth. Through experience and practice he had built up a personal skill in the art of making paper. This he tried to impart to those below him by personal contact and example, sounding a beater roll here, feeling of the stock with his fingers, watching the wire, weighting a press roll, touching a draw. He had no instruments of precision. He depended on intuition. But the thing most important to his success in business was his success in guiding the work of the men and women in the mill, supplying them with good methods, coaching them in good habits and sound judgment. That to him was the practical job of running a mill.

In contrast, the technical director of a large board mill got an order from his chief to put his stock preparation under control. It seems that they had established no way of knowing how much fiber was put in a beater, and, of course, none of the subsequent steps leading to a stock of uniform papermaking qualities. In their thinking they made no mental distinction between their middles stock and their liners, though they knew, of course, that they were furnishing different kinds of fiber for the two purposes and the results had to be different. Both the technical director and his chief assumed that control was something that could be purchased in a box and they proposed to have it by the first of the week. They were mentally fixed on a slowness tester, because some unwise advertising had presented to them the fact that the slowness tester is a measure of the degree of beating. And on the technical director's door was the word "Research."

Or again, because of price, a mill considered changing from one sulphite to another. First, some pulp from the new source was bought and blended with the old pulp. Small batches were put through a laboratory ball mill and figures obtained as to slowness and burst. Then the old source of supply was cut off entirely. The use of the new pulp brought surprising results: rattly paper was made when it should have been pliable; the surface was fuzzy when finish was required; there was bunchy formation when printing surface was needed; the color was a livid blue-white when the trade expected a mellow pink-white; there was low clay retention when opacity was necessary; and boardy paper came through when it had to be folded. Customers made complaints and there were allowances to pay. And the nicest looking building on the lot was the one marked "Research."

Now that the new sulphite has been running through the mill for some time, a better line of papers is being produced than before; but to get this result, there was unnecessary expense, unlimited risk to the business; loss of customer confidence, and protracted delay in completing the change. In the same way, the board mill will spend unnecessary money to get control; it will reap disappointment and by the law of averages abandon the idea. How costly and risky it is not to be directors in detail and in fact of the small daily tasks that when put together make up good mill operation. If the management had habitually practiced itself in collecting and collating more complete, more precise knowledge about each small job in the mill to the point of knowing exactly how to do it before it is done, the board mill's problem of control would have been automatically solved long ago, and in the other mill there would have been no chance of getting swamped with unknowns by a change of raw material.

If management fails to go that far, *is it management?*

◆ ◆ ◆

Psychrometric Charts . . . High and Low Pressures

A series of charts has been developed at the National Bureau of Standards which facilitates the determination of humidity from the readings of dry—and wet-bulb thermometers.

Humidity charts and tables heretofore used have been strictly correct only at one air pressure, if at all. The present charts are equally correct at air pressures encountered in stratosphere flights or in the deepest mines. While the pressure graduations on the charts run from that for 50,000 feet altitude to 10 times normal atmospheric pressure, the charts can be used at any other pressure by either of two expedients.

Not only can the charts be used to evaluate relative humidity or pressure of water vapor from psychrometric date; they can be used also to determine the dewpoint, the saturation pressure of water, how to obtain a desired relative humidity by heating or cooling a given atmosphere, and the precision required in psychrometric measurements to obtain a desired precision in the result.

Four charts comprise this series, two being for use each with Fahrenheit and with centigrade thermometers. By thus dividing the temperature range, part being covered on each of two charts, interpolation can be practically eliminated for ordinary work.

Combating Ice Troubles

in paper mill water power developments

CHESTER REED EARLE

FRAZIL ice and slush-ice clogging the racks, slowing down the water wheels; floating ice battering the flashboards on the dam and sometimes lifting them out of place; solid ice caked around sluice gates and Tainter gates, preventing them from operating; ice in surge tanks, straining the tanks or possibly plugging the outlets—such a catalogue of woe might be written nearly any winter by operators of many hydroelectric plants and industrial plants.

Paper mill executives and engineers cannot take the chance of failure of water supply because of any of the above troubles. Some precautions must be taken against them by nearly every mill, depending on the particular climate in which it is situated. The problem is complicated, moreover, by the fact that in certain parts of the country the winters are not of equal severity, hence the worst winter conditions might form a peak load, so to speak, that would be too much for the equipment provided for ordinary conditions.

Thus arises again the ancient problem to which the author has previously alluded in these columns, the problem of how much a shutdown costs a given mill and how much capital it is justified in expending to avert the consequences of a shutdown due to failure of the water supply. But that is another story and cannot be discussed here.

This article will assume that the mill management has established policies for analyzing such problems and will confine itself instead to an outline of some methods of combating ice troubles that have proved successful in the past.

The methods that can be used naturally will vary with the source of the water supply and the size of the paper mill. A few of the larger paper mills operate hydroelectric plants of 25,000 to 50,000 kw. capacity, but the capacity of the average paper mill hydroelectric plant usually will be of about 4,000 to 5,000 kw. Water wheels often drive pulp grinders, whether a hydro plant is installed or not. Water for process and for boiler feed must be obtained in large quantities through some sort of intake works regardless of the arrangements for generating electric power. Thus it is not to be inferred that all of the methods suggested here can be used in any one plant or that they should be used without modification to the conditions.

Sluice Gates and Tainter Gates

Practically all large hydroelectric developments require some method of bypassing waste water and many of these plants have used Stoney type sluice gates, which may be from 30 to 50 ft. wide and 15 to 25 ft. high.

Three effective methods that have been used for keeping such gates free of the ice that might freeze them in solidly causing damage to the gates and preventing water from flowing, are as follows:

1—Downstream faces of the gates may be housed in with two layers of timber sheeting with insulating material between. Then electric or steam heating coils are placed inside the gate and sometimes blowers are installed to circulate the warm air.

2—Embedded parts that form the seat for the gate and transmit the loads to the concrete are made of hollow section and kept warm by steam pipes or electric heaters placed inside the sections.

3—Air bubblers can be installed in the water just upstream from the gates to maintain a circulation of warmer water from the lower part of the pond up along the face of the gate.

In some cases, combinations of these methods have been used. Placing of heaters in hollow embedded parts has been found especially helpful in preventing ice formation when the gate is raised and for preventing ice accumulation from spray or leakage water just downstream. A properly housed gate, it has been claimed, may be kept in operating condition with an energy expenditure of 16.5 watts per square foot of gate area, assuming proper insulation and air circulation. But a bubbler system alone, without heat inside the gate, would not keep it in operating condition.

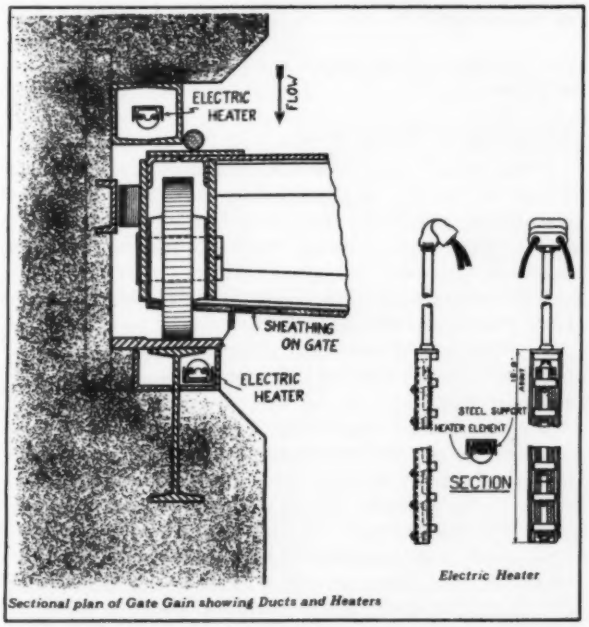


Fig. 1—Heaters in hollow embedded parts of sluice gates

Heater units for embedded parts that have been found most satisfactory by the Dominion Bridge Company are shown in Figure 1. Heaters for the interior of a gate may be any of the standard space heaters; a number of units of from 3 to 5 kw. each have been found most convenient. Designs prepared by the Abitibi

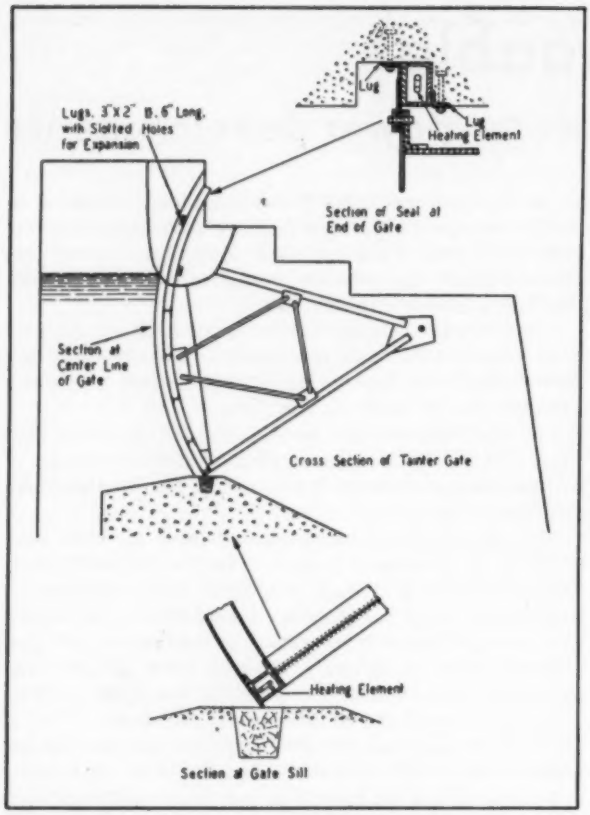

Lugs. 3"x2" B. 6" Long, with Slotted Holes for Expansion
Lug
Lug
Heating Element
Section of Seal at End of Gate
Section at Center Line of Gate
Cross Section of Tainter Gate
Heating Element
Section at Gate Sill

Fig. 2—Suggested method of heating gains and bottom of Tainter gates

Power & Paper Company for a Tainter gate are shown in Figure 2.

Protection of Flashboards

Where flashboards are used on dams and where there is any fluctuation in water levels, a channel should be maintained along the upstream face of the boards to keep the ice from pushing over the boards or lifting them up.

For maintaining such channels three methods have been used effectively, as follows:

1—Open channels are cut along the upstream face of the flashboards either by hand or with a steam jet saw, shown in Figure 3.

2—Compressed air bubblers (Figure 4) have been installed along the upstream face of the flashboards, the air released by the bubblers circulating warmer water to the surface and keeping the channel open.

3—Electric heaters or lights have been arranged under reflectors to direct the heat downward and prevent ice from forming under them along the face of the boards as shown clearly in Figure 5.

When labor costs are high, the expense of cutting open channels is rather excessive. Even with a steam jet saw (like the one illustrated) capable of cutting 40 feet of 38-inch ice an hour, such channels require continuous attention if they are to be of any value.

Experience with lamps has shown that carbon lamps are more effective than Mazdas and that space heaters of equal wattage have little effect.

When either bubblers or lamps under reflectors are used, drifting snow should be guarded against. Where water level fluctuations are slight, reflectors may be placed close to the water surface. With bubblers, it is often advisable to stretch strips of canvas on wooden frames over the channel to keep out the snow. Experience with snow fences for this purpose have not proved generally satisfactory.

Preventing Troubles on Racks

One of the most interesting methods developed for preventing frazil and slush ice from clogging racks on intakes is to heat the rack bars by passing an electric current through them. For example, at the Shawinigan Falls plant containing three generating units each rated at 43,000 hp. at 143 ft. head, it was found that it required 400 kw. each to heat the racks. Another interesting installation was made at the Alberfeldie plant of the East Kootenay Power Company, based on the experience at Shawinigan. The racks at Aberfeldie are 17 ft. wide and 17 ft. deep, made of ¼-in. by 2½-in. bars on 2-in. centers. Before the electric heating was tried, the plant could use only 25 per cent of the available water during the three coldest months, but afterward there was little trouble, the frazil and slush ice passing through racks and turbine runners without sticking. About 100 kw. of power are needed for these racks.

At the Hull No. 1 and No. 2 plants of Gatineau Power Company, a mechanical rack raking device has been used for keeping the racks clear under extremely severe conditions. This device consists of a number of gear wheels that are rolled up and down the sloping racks by a motor-operated mechanism. This actually breaks up the ice and pushes it through the racks.

In a number of plants where frazil and slush ice tend

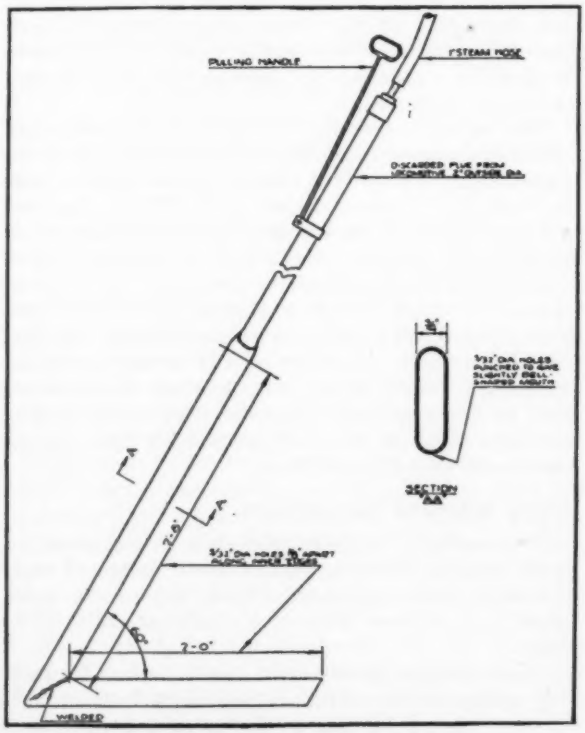


Fig. 3—Details of a steam jet saw for cutting ice

to clog water passages and slow down or completely stop water wheels and turbines driving generators, it has been the custom to shut down units and heat them with live steam blown into the wheel pit for a time. This will often permit a unit to run for some time after steaming and if enough units are available, may enable the plant to operate. If a hydroelectric plant were needed for peak load service only, it might have to be kept steamed for several hours, if the ice were bad, so as to be ready to take the load when necessary.

By-Passing Ice

In the case of low-head hydroelectric plants of from 20 to 50 ft. head and probably in the case of low-head dams for impounding water for industrial purposes, the quantity of water used may be so great that it would be impossible to furnish enough heat to racks to raise the temperature high enough to prevent trouble from frazil and slush ice. It has been found advisable, in many of these cases, to waste 10 to 15 per cent of the total water available in the stream and to use that water for flushing away as much of the frazil and slush ice as possible.

To do this, the usual procedure is to wait until several inches of ice have formed over the stream in the early winter, then to cut one or more channels, starting from the end of the dam farthest from the intake and reaching diagonally across the river or pond to a point upstream from the intake but on the same side of the stream. At the end of the open channel at the dam a small spillway is opened.

Through this channel, which must be kept open, ice can be hauled by hand or horses and sluiced over the dam. Frazil and slush ice coming down the river under the ice cover will float near the surface and when they reach the diagonal channel can be caught and sluiced over the dam. Such methods entail tremendous labor and hardship in some of the far northern plants, but they are the only ways by which such plants can be kept in operation during the coldest months.

Where there is no cake or floating ice, modern hydroelectric plants equipped with propeller runners have often passed frazil ice through them without serious trouble. In older plants, however, using small single-runner vertical Francis turbines or twin or four runner horizontal Francis units, frazil ice will block the runners completely, it has been stated, in from 15 minutes to one hour.

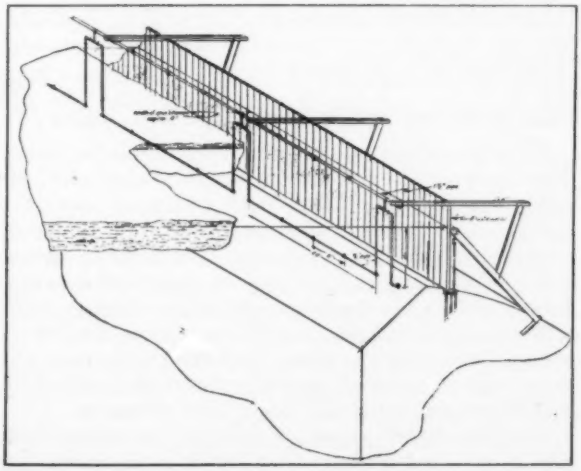


Fig. 4—Compressed air bubbler system for maintaining open channel at flashboards

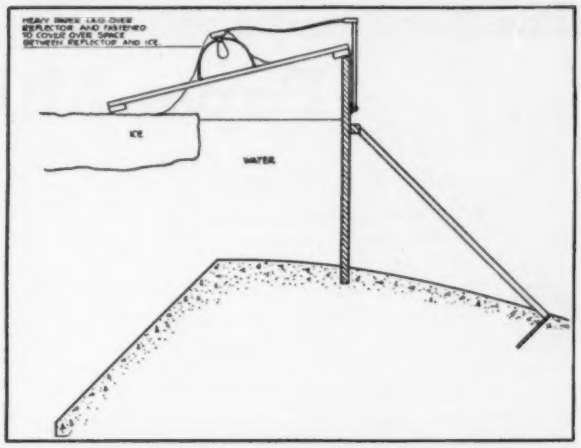


Fig. 5—Reflectors and lamps to maintain channel in front of flashboards

Heating and Insulating of Surge Tanks

Where loads are fluctuating, the water in a surge tank is not quiet, hence in cold climates it may be possible to operate surge tanks under those load conditions without either heating or insulation. On the other hand, small tanks or tanks with small risers have often frozen solid. Housing such tanks often prevents this even where heat is not used inside.

Wood lagging is often used for this purpose but with some attendant fire hazard. Various insulating materials, both slab and plastic, have been employed with good results in a number of plants. Without heat in the tank, small amounts of ice may form on the sides near the bottom but it is seldom enough to cause trouble.

Without doubt, if a paper mill hydroelectric plant operates under conditions necessitating a surge tank, it will be best to heat it if the winters are at all severe. One type of heating and circulating system that has been successful employs a pump to draw cold water from the bottom of the surge tank, forcing it through a small boiler tank containing sufficient 5-kw. immersion heaters (or other suitable heating element) and then forcing it to the top of the tank where it is sprayed down onto the surface of the water. This warms air in the upper part of the tank and helps circulation.

It is believed that the proper place to apply heat is directly in the water, because much of it is lost in radiation if the heat is applied in the air space between the sheathing and the tank shell. In some surge tanks, immersion type electrodes are suspended in the water by floats, which keep them near the surface, because 32-deg. water sinks when heated slightly.

In conclusion, may it be suggested that mill executives investigate their ice-trouble preventive measures now to determine whether they are effective, up-to-date and economical. In instances where they are found to be wanting, it is hoped that this discussion may stimulate action and cause the difficulties to be remedied before the beginning of another winter.

The Economics of
Paper Mill Painting

A. H. KENNEDY
Plant Conditioning Engineer
The Sherwin-Williams Company

ONE outstanding production asset that has not been capitalized to anything like its fullest extent in the paper industry is paint. White paint for better light, better sight; and white paint supplemented by color, for greater safety, faster operation, improved employee esprit, better working conditions, finer workmanship, reduced spoilage, and lowered insurance rates—to name but a few assets—make paint as much a production tool as the grinder, the beater, and the paper machine.

Properly selected, paint becomes not only a production economy, but a means to drastically reduced maintenance costs. Specially formulated paints designed to give exceptional service under the many complex and exacting conditions of the paper industry make it possible for the maintenance man selecting suitable types of paint, to maintain high standards at a minimum expenditure, and at the same time effect greater production efficiency. To further simplify the maintenance man's problems, leading paint manufacturers have adopted a policy of preparing complete paint standard charts. These charts specify the types of paints best suited to particular conditions; stipulate the best methods of application with respect to various surfaces, and suggest colors that serve to make paint functional in promoting safe and efficient operation.

From the standpoint of better light and better sight; both the quality and intensity of light must be considered. Easy seeing depends upon an abundance of daylight or artificial light, controlled and diffused by white painted upper walls and ceilings. Glare from exposed tungsten lamps, direct sun rays, harsh reflections, and sharp contrasts between dark and light areas, must be avoided as distinct industrial menaces.

Where seeing conditions are favorable there will be an increase in speed of handling and in safety. Movements become surer and more accurate, and moving objects appear to be traveling at a lower rate of speed. This will readily be appreciated in the passing of paper over the dryers, in the feeding of calenders, or in any one of the difficult and dangerous pulp and paper-making operations.

Light Reflection Considerations

Tests conducted by the Sherwin-Williams Company using the foot candle or sight-meter, and utilizing indirect illumination in three miniature rooms identical in every respect save for the wall and ceiling surfaces, showed the extremely low reading of 2 foot candle for the unpainted brick walls; 5 foot candles for the painted, but dirty and dingy walls; and a jump to 22½ foot candles for the new white painted walls. Translated to a paper mill, these tests prove that the mere application of white paint affords greater use of daylight, and for longer hours, and that artificial lighting will be more efficient and less costly.

For most industrial requirements from 10 to 30 foot candles of light are essential to easy visibility. Isolated areas may only need from 3 to 5 foot candles. Dark objects, objects not set off by contrasting colors, delicate operations, and objects requiring close reading all necessitate fairly high levels of illumination over the entire floor area and locally. Inasmuch as the eye sees by reflected light and not by the light falling upon an object, darker objects require higher sight-meter readings to be seen with ease.

The acompanying table shows the comparative light reflection values of colors, based upon magnesium carbonate (not a paint pigment) as standard at 98 per cent.

Color	Per Cent of Light Reflected
White (new)	82-89
White (old)	75-85
Cream	62-80
Ivory	73-78
Green	48-75
Yellow	61-75
Buff	49-66
Blue	34-61
Pink	36-61
Gray	17-63
Tan (Dark)	30-56
Red (Dark)	13-30
Green (Dark)	11-25

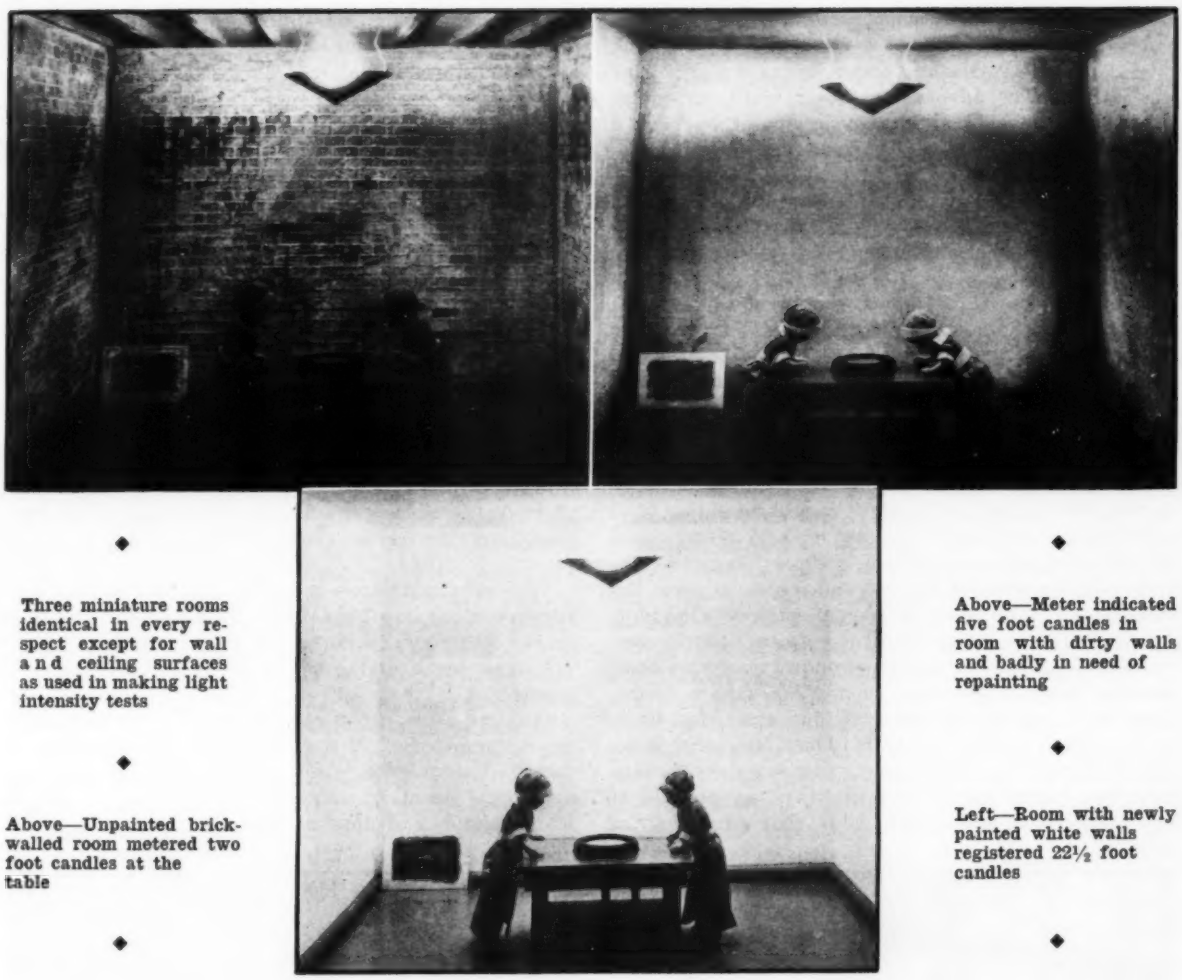
Ordinarily, the window area of a building should not be less than 30 per cent of the floor area for a minimum of 10 foot candles. A window 10 feet high can be expected to carry this minimum into the building for about 30 feet provided surfaces of high reflection values are used. Dark shades of paint or dirty walls and ceilings will result in greater losses. White or light tints of paint are therefore potential light sources. But they must be maintained up to their original brightness and cleanness to give the desired results.

Plant Conditions and Painting Recommendations

From a strictly maintenance angle, consideration must be given to conditions present—chlorine and sulphur dioxide fumes; alkali and acid conditions; excessive humidity; high temperatures; and the tendency toward heavy mildew formation. For perhaps 75 per cent of the walls and ceilings in paper mills a well formulated standard gloss or egg-shell mill-white paint will be suitable. Fume conditions require the use of special fume resisting paints, and other adverse conditions require types of specially formulated paints to make the paint dollar talk results and economy.

Chlorine fumes present a color in themselves, and where there is a deposit which settles on the paint surface, a brown coating results.

Sulphur dioxide fumes produce a precipitant which



Three miniature rooms identical in every respect except for wall and ceiling surfaces as used in making light intensity tests

Above—Unpainted brick-walled room metered two foot candles at the table

Above—Meter indicated five foot candles in room with dirty walls and badly in need of repainting

Left—Room with newly painted white walls registered 22½ foot candles

will rise to the ceiling and settle down, sometimes to about 4 to 6 feet from the floor before it becomes eliminated. The result is that while the lower stretch of wall around the floor will be almost its natural whiteness, the upper portions and the ceiling become quite brown. There is, of course, no paint which will eliminate this condition, but the important consideration is to apply a paint sufficiently fume resisting that will not itself turn yellow or brown, and which is washable so as to permit regular satisfactory cleaning to restore the needed white surface.

The adoption of ventilating and air-conditioning units in machine rooms help to overcome the problem of excesses of moisture and condensation. Considering the fact that some 150 to 200 tons of water must be driven off from the wet sheet as vapor to produce 100 tons of finished paper, it becomes easy to appreciate the corrosion and condensation problem to be met.

Providing sufficient care is taken to clean and dry wall and ceiling surfaces before painting, standard mill-whites will usually give good service. Where cold air is allowed to enter these rooms through transoms, open doors, etc., a mildew condition often results. Attempts to develop insecticide paints to meet these conditions are generally considered unsatisfactory, and dangerous to painters applying them. Paint cannot resist the mildew action under such conditions, although gloss paints stand up better than other types. Air-conditioning of these rooms by the latest high capacity units which inject warm, fresh air rather than direct cold air, greatly reduces the mildew problem; while at the same time it affords greater comfort and results in more rapid production of a better product.

For best results in using the gloss mill-whites, an undercoater should always be applied. Inasmuch as whiteness and good body are the keynotes to an efficient and lasting paint job, the use of the undercoater will prove an economy in the long run. The undercoat selected will be determined by the surface to which it is to be applied.

In the painting of pipe lines, conduits and other obstructions placed against upper walls and ceilings, the trend is to finish these in white or tints corresponding to the surfaces against which they are seen. This avoids a cluttered appearance and makes them serve to further reflect and diffuse light. Identification of pipes is made possible by applying color bands at regular intervals.

Because white sometimes proves too intense for visual comfort when applied to lower walls and other surfaces constantly in the line of vision, it is customary to adopt light pastel shades of green, buff, or other suitable colors for dados, machines and other equipment closer to the

floor level. Where heat is excessive, the use of tints of blue will reduce complaints from workers. Blue is cool, green is restful, yellow and orange are stimulating, red is exciting. The adoption of colors with respect to their psychological effects will be found to have a marked influence on the attitude and efficiency of workers. The old-time and depressing machine gray and black is rapidly giving way to more pleasing colors. Many industries are reporting very definite gains in the productive efficiency and quality of workmanship from employees as a result of the adoption of color on machines. The colors chosen should afford contrast with the work being performed. Operating levers given colors that distinguish them from the body of the machine will aid in increasing the speed and accuracy of handling. Red adopted for danger spots shouts a warning which has been proven to definitely reduce the accident rate. It should be applied to machine guards, rails and danger zones. Chemicals in storage or waste liquors, etc., which are harmful should be indicated as such by red markings. The use of light pastel colors on machines not only affords greater light reflection and easier visibility of exposed and concealed parts, but stimulates an interest on the part of employees in giving greater care to machines and in keeping them cleaner.

Colored paints for the paper industry should be of the gas and fume resisting type. This type is formulated to withstand extreme conditions and is less likely to turn brown or become spotted black from acid fumes attacking the lead which most outside paints contain. Suitable undercoaters should always be applied in accordance with the surfaces to be painted. Iron and steel are best treated by applying a coat of lead-chromate metal primer after removing all grease, rust, scale, and other foreign matter. This type of primer surpasses all others in corrosion resistance. It applies easier, and is actually less expensive than red lead.

The vehicle employed in a lead-chromate primer is of considerable importance in determining its anti-corrosion qualities. A careful blending of linseed oil with fossil resins and tung oil produces a tighter and more resistant film. A primer of this character will be found to check the electrolytic action on the surface of the metal, now considered to be the cause of rust, which is simply the return of the metal to its oxide state. The application of metallic or other electrically conductive paints as primers, in some cases may actually promote corrosion. As finishing coats over a lead-chromate primer, the graphite, charcoal-carbon, the metallic, and the graphite-carbon base paints have excellent water shedding properties and serve satisfactorily even under many adverse conditions. These paints are generally suitable for most structural steel and iron surfaces.

Wherever acid fumes are present, only a special acid fume-resisting paint should be employed for finishing coats. These paints do not contain lead, hence they do not turn black and disintegrate as would ordinary paints.

Gas and fume-proof colored enamels are especially recommended for all machines and accessory equipment. Where color is desirable, but the presence of heat, gas, steam, or sulphur might affect the life of standard types of finishes, enamels known as gas and

Steel window frame and sash showing results of poor surface preparation for paint and neglect

Fire door showing how rust may form under paint if surface is not thoroughly cleaned and a rust-proof priming paint applied

heat-resisting, or gas engine enamels will serve admirably. After thoroughly drying they possess extraordinary durability, and are not affected by oil, grease, moisture, or temperature extremes. They will also withstand abrasion, and constant vibration without checking or cracking.

Excessive heat around boilers, stacks, flues, and the like, usually requires the application of exterior heat-resisting aluminum paint or the heavy bodied, free flowing standard smoke stack black. All rust, dirt and grease should be removed from the surface, and two coats of stack paint should be applied for best results.

New, bright galvanized iron primer presents such a smooth surface that it does not permit the paint to bond properly. Therefore, as the paint loses its elasticity with age, it is in great danger of chipping or flaking off with any sudden change in temperature which would cause excessive contraction of the metal. For this reason, galvanized iron should be permitted to weather sufficiently to etch the surface slightly and thus provide proper "tooth" for the paint coatings. This action can be accelerated to permit immediate painting by the application of a weak solution of vinegar or a preparation consisting of 8 ounces of copper sulphate or copper acetate to a gallon of water.

Ordinary primers have not been found to be satisfactory for use on galvanized iron because of their inability to inhibit a certain form of oxidation or deterioration of the zinc coating. This action, which is progressive, has the effect of breaking down the bond of paint-to-metal and finally results in the paint coming off. Recently developed special zinc pigment primers seem to have this desirable property of inhibiting corrosion of the zinc coating beneath the paint and distinctly superior results have been obtained with them.

Metal window frames and doors are frequent causes of trouble from corrosion due to constant condensation of moisture upon the glass or panels. It is futile to paint these surfaces without scraping, sanding, or otherwise removing all traces of rust, grease and dirt before painting. Lead-chromate primers are highly recommended. After priming, glass may be inserted and puttied up. Paint or putty should never be applied to a moist surface. Moisture locked in will promote corrosion and loosen both paint and putty. Care in this respect and in the selection of suitable finishing coats will overcome this one common problem of the maintenance man.

Heat reflection factors of paint are often important considerations in paper mills as in other industries. Just as white paint is the most efficient reflector of light, it is the best reflector of heat. It not only reflects heat from exterior surfaces, but conducts heat out from tanks, pipe lines, radiators and the like.

Piccard's first balloon flight was in a black painted gondola. He nearly sweltered under a temperature of 100 deg. Fahr. The second flight, in a white gondola, made him suffer from a temperature below freezing; yet the stratosphere temperature remains constant at —75 deg. Fahr. White paint then on sheds, tanks or other structures becomes a means of radiating much excess heat. Where fume conditions exist, special fume-resisting whites should be used.

While aluminum paint also shows a fairly high degree of heat reflection, it has the fault of retaining heat; hence, it is inefficient as applied to radiators and the like. Tests made by the American Society of Heating and Ventilating Engineers show that paints containing bronze powders reduce the radiation of heat from radiators about 25 per cent. On the other hand, paints made from a zinc-oxide or lithopone pigment in light tints do not appreciably affect radiation. Kinds of paints and different colors should therefore be used in accordance with conditions and desired results.

New concrete or brick surfaces should be brushed with a solution of two pounds of zinc-sulphate or three pounds of zinc-oxide crystals to the gallon of water. This will avoid the dangers from free alkali. These porous surfaces also require a special sealer coat which should be applied in dry weather after the wash has been permitted to dry about 48 hours. Finishing coats should always be special concrete paints. Standard outside paints are not generally satisfactory. Tunnels, passageways, or other concrete surfaces subject to sweating through of moisture from behind, require the use of a porous type paint. Tight film paints will peel under these conditions; and no paint should be applied to concrete that is damp.

For foundations and many superstructures, an asphaltum type paint is recommended for its permanency and ability to withstand extreme conditions. It is the best answer to damp and waterproofing problems. Properly selected and treated by the paint manufacturer the asphaltum type paint boasts the following qualities: elasticity, extreme adhesion, acid and alkaline resistance and resistance to temperature extremes. One or two coats that are not brushed too thin are generally advised.

Pulp and paper mill basements sometimes have bad floor conditions, which, together with crowding of machinery, dampness, and poor illumination combine to make an unhealthy and hazardous situation. All these evils can be overcome very largely by means of properly selected paints. Waterproofing paints applied to the flooring and walls will not only preserve them if they are wood or reinforced concrete, but will damp-proof them quite completely. White paints will also definitely increase the level of illumination with the result that fewer accidents will occur. The use of light and contrasting colors on all equipment will serve to further increase the safety factor and take the gloominess out of these basements and other parts of the mill.

Paint serves many other functions. Coal-tar paints and cements for roofs, exterior and interior wood paints and enamels, black and clear-type insulating varnishes for all electrical equipment, are but a few of the other types of paints suited to the diverse requirements of the paper industry.

Maintenance men and paper mill operators can attain maximum operating efficiency at a minimum maintenance expenditure by the selection of paints that will be functional—paints that serve as production tools, and paints that are of the right sort and quality to stand up under exacting demands. These functions of paints and their special formulations to meet the various requirements have been studied by leading industrial paint manufacturers, and the services of their engineers will greatly simplify the problem of scientific painting.

A Study of Stiffness Testing of Papers

CHARLES A. MINOR and JESSIE E. MINOR

THE goal of all paper testing methods is to so define paper quality as to be able to predict the reactions of a sheet of paper to the normal stresses for which that type of paper is intended. Of the numerous methods which have been proposed and tried out and for which especial equipment has been built, only a few have stood the test of practical experience. These few instruments have been of inestimable value in giving to the paper buyer and manufacturer a measure of quality which accords with experience in its relation to use requirements.

During the past few years intensive interest in paper permanence and the development of code specifications have intensified the search for more and better tests in order to more accurately define paper quality. Among the physical tests which have received new interest and new equipment during these years is that of *stiffness*. To meet the interests of a wood paper manufacturer, the Gurley instrument for stiffness testing was developed and from the need of a large paper jobber for a better definition of index paper the Suvant appeared. Most of the data of this report was prepared on a Gurley instrument but the results for one set of samples was checked on a Suvant.

A study of the evidence as shown in this report seems to point to the following general deductions as to the value of stiffness testing for paper quality:

1—Stiffness is largely a matter of manufacturing manipulation and is, therefore, not a factor of fiber quality except insofar as different kinds of fibers are subjected to differences in manipulation as in beating, in the sizings added and in any other sources of fiber cementation.

2—For the heavier papers, such as tag and index papers, stiffness is much more sensitive to beater hydration than is tearing resistance. It is also probably less sensitive to fiber weaknesses and to the shortening of fiber length than is tear.

3—For thinner papers which are beaten to maximum strength as are bonds and ledgers, stiffness has no particular advantage in sensitivity over tear. For such papers stiffness brings less distinction between rag and wood papers than does tear.

4—Stiffness testing for some grades of papers should be a valuable substitute or supplement to freeness testing as a measure of beater hydration.

The set of data given in Table I and Graph I was developed on 42 samples of tag papers made from sulphite and groundwood furnishes and representing the standard grades from a number of different mills. All samples were conditioned to 65 per cent relative humidity and 70 deg. C. before testing to insure uniformity of condition. However, it is probable that, contrary to the folding test which measures fiber quality, the effect of humidity is reasonably uniform on a given set of samples and that stiffness, tear and Mullen could be compared at any uniform humidity. Results obtained were not calculated to uniform thickness and weight since such factors should not affect the comparison of tests made on the same samples.

To avoid clouding, the general indications of this set of tests by the normal individual variations in papers made in various coarse mills, results on these papers for stiffness, tear and Mullen, were graded in the order of increasing stiffness, then averaged in sets of three. In the results shown in Table I and Graph I, each figure given is an average of results on three different samples the stiffness test results of which were contingent.

From this data we may reason that:

1—Since all points fall reasonably near the curves, there is probably a close relation between stiffness and tear and between stiffness and Mullen. The close proximity of the two curves for these papers which are probably not beaten to the stage of decreasing tear suggests that in this case tear and Mullen are measuring the same factor of hydration development.

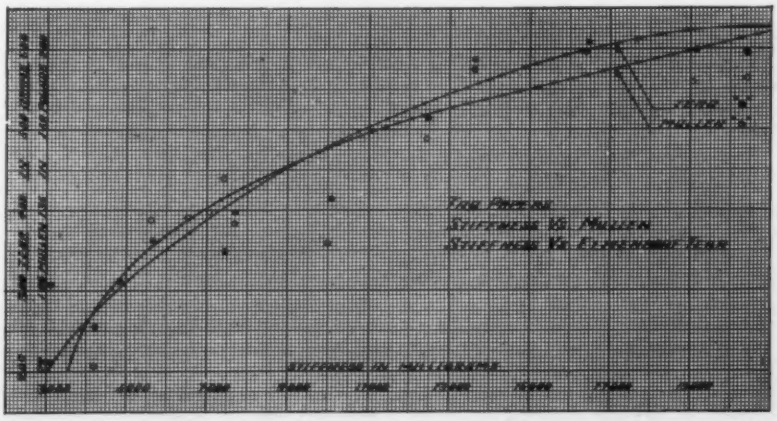
It would be expected that stiffness would retain its close relation to beating much longer than does tear, and that stiffness should increase in value even after beating progresses beyond any increase for the strength tests. In the tear test, where the fibers are torn apart from each other, the resistance varies with the lengths of the fibers as well as with the strength of the cementing bonds and decreases regularly after fiber lengths begin to appreciably decrease

Table I

Tag Papers in Order of Stiffness Test Results

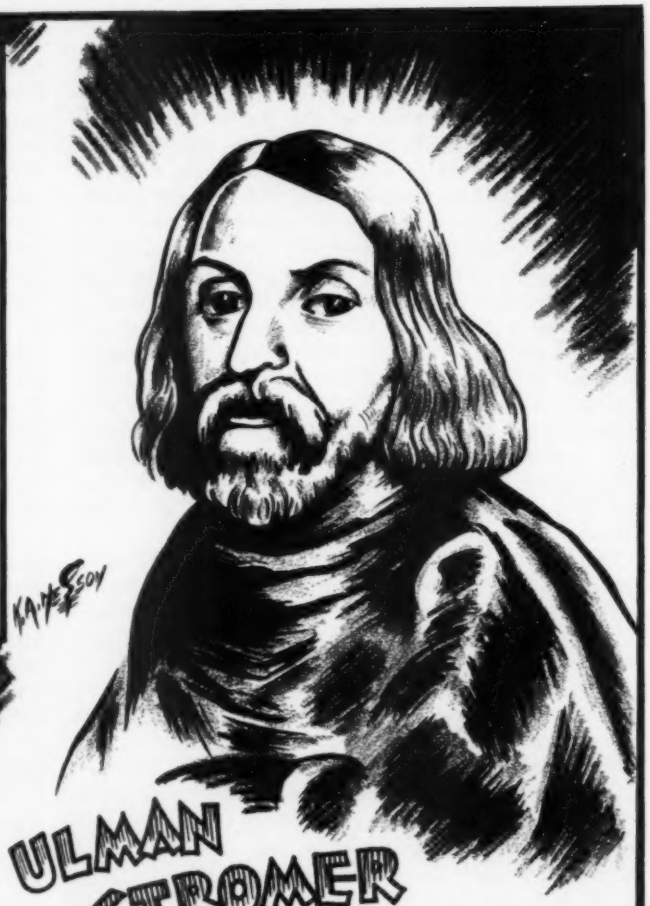
Number	Stiffness	Tearing Resistance	Mullen Burst	Ratio Stiffness/Tear
1	3121 millig.	302 grams	75 lbs.	10.3
2	4215	257	73	16.4
3	4843	306	106	15.9
4	5669	360	132	16.0
5	6617	368	133	18.0
6	7029	399	135	17.6
7	7426	348	151	21.3
8	8348	397	131	21.0
9	10063	413	122	24.4
10	12425	516	166	24.1
11	13696	589	191	23.3
12	16559	643	199	25.7
13	19044	598	187	31.8
14	20419	590	190	36.6

Graph I



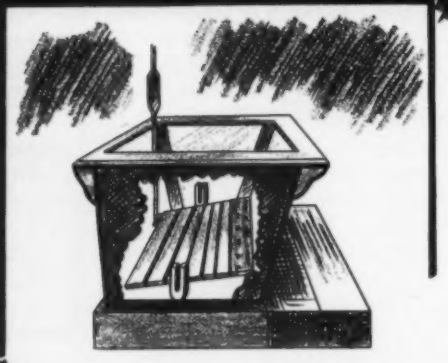
Paper Sketches---

IN THE REIGN OF AUGUSTUS CAESAR, EGYPTIAN PRIESTS COVERED FIRST-GRADE PAPYRUS SHIPPED TO ROME WITH RELIGIOUS WRITINGS WHICH THE ROMANS WERE FORCED TO ERASE BEFORE SELLING THE PRODUCT.



ULMAN STROMER

MEMBER OF THE NURNBERG SENATE, PROBABLE FIRST PAPER MAKER OF GERMANY AND AUTHOR OF THE EARLIEST KNOWN TREATISE ON THE CRAFT, LEARNED HIS ART FROM ITALIAN LOMBARDS AND SET UP IN BUSINESS ABOUT 1390. HE TRIED TO KEEP TRADE METHODS FROM POSSIBLE COMPETITORS BY SWEARING HIS EMPLOYEES TO ABSOLUTE SECRECY.



IT TOOK PAPER MAKERS SEVENTEEN CENTURIES TO FIND A SATISFACTORY SUBSTITUTE FOR LABORIOUS HAND-STIRRING OF PAPER PULP IN VATS. IT WAS NOT UNTIL 1800 THAT THE ROCKING AGITATOR, CRUDE FORERUNNER OF THE PRESENT ROTARY AGITATOR, DISPLACED THE STIRRING POLE OF THE ANCIENTS.

THE PER CAPITA CONSUMPTION OF PAPER IN THE UNITED STATES INCREASED FROM ONE POUND IN 1810 TO 220 POUNDS IN 1929.

with beating. Stiffness testing measures the resistance of paper to a slight bend from a 4-inch strip to 4¼-inch arc and creates no rupture in the cementing material or between fibers and sealing. Since unbeaten fibers are more flexible than paper, such a stiffness test cannot be appreciably affected by fiber length.

2—The range covered by stiffness tests for these papers is much wider than that for tear indicating that much closer and finer distinctions should be possible from stiffness than from tear tests. While the highest stiffness in the list is 6.64 times the lowest, the ratio for tear is only 1.95 showing for stiffness more than 3 times the sensitivity of tear.

3—The Mullen test for this series of papers of similar furnish increases with stiffness and tear though it is less sensitive than is stiffness. While the highest stiffness figure is 6.64 times the lowest, the ratio of the highest to lowest for Mullen is only 2.53. Thus we see that stiffness testing on a series of competitive papers should be at least twice as sensitive as Mullen or tear to differences in the manner of manufacture.

The Mullen tests are protected by the large stretch in the cross direction as is shown by the usual Mullen break being *across* the stronger machine direction of the paper. For that reason the test becomes, to a larger extent than stiffness or tear, a measure of fiber strength as well as of hydration and sizing strengths.

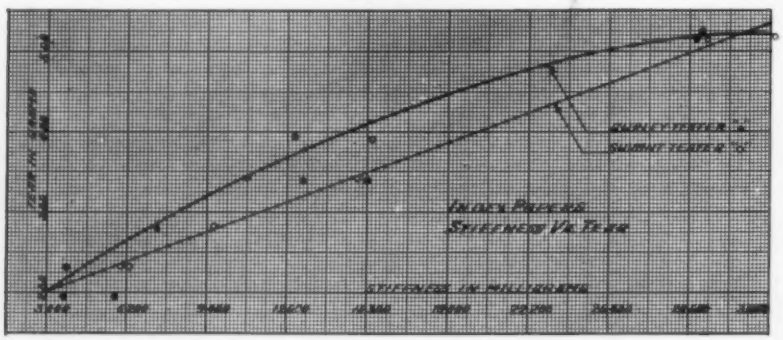
The conclusions drawn from the study tag papers was next checked on a series of nine index papers, being the standard grades of one manufacturer. Gurley stiffness and tearing tests were made on these papers only after conditioning to 65 per cent relative humidity, though the Suvant tests were made without humidification. Both instruments are designed to measure the same bending force through a small arc and results given in Table II and Graph II indicate that both instruments are measuring the same property. Regardless of the difference in the amount of humidification, both instruments grade these papers in the same order. Each figure given in the table is an average of the results obtained in the machine and cross directions.

Graph II shows that for index papers as well as for tag papers, the points for stiffness versus tear lie reasonably near a true curve or line and that probably both curves are measuring the same general property. The difference in the shapes of these two curves may be due to having an insufficient number of points for defining each curve.

Table II
Index Papers in Order of Stiffness Test Results

No.	Folio	Thickness mils	Rag-Content Per Cent	Stiffness Gurley Tester	Stiffness Suvant Tester	Tearing Resistance	Ratio Gurley	Stiffness Tear Suvant
1	106.7	17.0	53	3634	9.0	199	18.3	4.5
2	50.3	8.5	100	3794	10.5	227	16.7	4.6
3	83.8	13.0	75	4110	9.6	231	17.8	4.2
4	79.0	11.8	63	7588	21.7	278	27.3	7.8
5	65.9	10.5	100	11068	40.0	339	32.7	12.1
6	49.6	8.0	60	12960	41.1	399	33.3	10.5
7	108.9	18.0	75	13276	39.0	341	39.0	11.4
8	49.9	8.3	75	29081	83.5	513	53.7	16.2
9	83.8	13.0	100	29176	92.0	516	56.6	17.8

Graph II



Graph III and Table III show the results of tests on a series of bond papers. Table III shows for index papers even more markedly than was shown for tag papers the greater sensitivity of stiffness as compared to tear. While the largest tear figure is 2.59 times the smallest, the largest stiffness figure is 8.02 to 10.3 times the smallest showing that for index papers also, stiffness should be a more desirable control test than tear.

The ratio of stiffness to tear in the tag papers varies from approximately 10 to 36, while that for the series of index papers varies from 18 to 36. It is probable that the surface compression from hard calendering is more developed in the index papers than in the tag papers and that this affects stiffness more than it does tear. Again, the higher figures for the index papers may indicate that the greater care which is exercised in making the higher grade index papers as compared to tag papers is reflected more accurately by the stiffness test than by tear.

There is no apparent relation between stiffness and rag content for this grade of papers even when stiffness is calculated to unit weight or unit thickness. Unit weight stiffness for number 2 of 100 per cent rag content is 75.4; for number 6 of 60 per cent rag content 261.3; and for number 8 of 75 per cent rag content 582.7. This fact is all the more striking since the ratio of weight to thickness does increase quite regularly with increasing rag content which suggests that in the hard calender pressing given to index papers, the wood fibers are more easily compressed than are the rag fibers. It would be expected that such a density difference, associated with a fiber quality difference, a formation difference and undoubtedly a different distribution of hydration and sizing, should affect stiffness.

The next interest in this work related to the value of stiffness testing on such papers as bonds and ledgers for which the tear test has already received wide recognition. For this purpose 35 bond, ledger and book papers from various mills and with furnishes from 100 per cent new rags to 100 per cent wood pulp were tested. Folio weights varied from 20 to 28 pounds, but again weight and thickness were not considered since parallel tests for each sample were made on the same sheet.

The bonds and ledgers do not show the same enhanced sensitivity to stiffness as was shown by tag and index papers but they do furnish an interesting bit of evidence as to the relation of fiber quality to the stiffness developed. To bring out this relation the table has been divided into four major sections and the graphs are drawn for each division separately.

From Table III and Graph III the following evidence is deduced:

1—Stiffness for high grade rag bonds is nearly duplicated by many low grade rag content or wood papers giving further evidence that stiffness is not influenced by fiber quality but by methods of manufacture.

2—The ratio of stiffness to tear in this series is much nearer to unity in this series than in the tag or index papers and there appears to be no particular advantage for stiffness rather than tear for bonds and ledgers.

3—The average ratio of stiffness to tear increases with the wood content of the paper. This is shown in Graph III by the regulated differences in the curves as the wood content increases. Also from the table we see that the average ratio of stiffness to tear for the all-rag papers of 2.38 is practically unaltered in the series of rag content above 50 per cent but increases to 3.48 for papers of less than 50 per cent rag content and to 4.63 for the all-wood papers. Sample number 8 is an all-rag paper for which the ratio of stiffness to tear

Table III

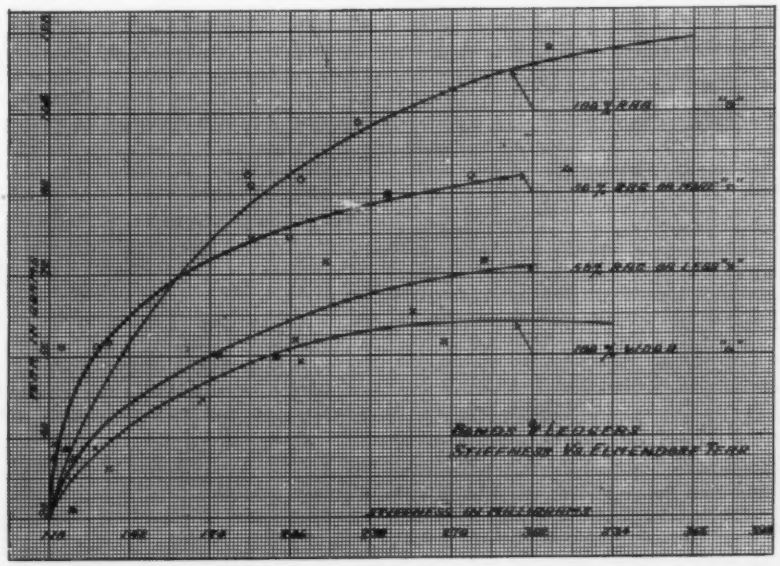
Bonds and Ledgers in Order of Stiffness Test Results

Number	Rag Content Per Cent	Paper	Gurley Stiffness Test	Elmendorf Tearing Resistance	Ratio Stiffness to Tear
1	100 (new)	Bond	189	92	2.05
2	100 "	Bond	190	90	2.11
3	100 "	Bond	201	90	2.23
4	100 "	Bond	210	91	2.30
5	100 "	Bond	233	102	2.28
6	100 "	Bond	278	91	3.06
7	100 "	Bond	309	116	2.66
8	100 "	Bond	389	106	3.67
9	100 (worn)	Bond	178	48	3.72
10	100 "	Book	365	136	2.68
11	60	Bond	113	58	1.95
12	80	Bond	127	58	2.18
13	70	Bond	132	59	2.22
14	65	Ledger	205	79	2.61
15	75	Ledger	243	89	2.73
16	35	Bond	111	35	3.18
17	25	Bond	111	38	2.93
18	45	Bond	120	35	3.44
19	25	Bond	127	37	3.43
20	25	Bond	134	33	4.05
21	25	Bond	171	47	3.62
22	25	Bond	178	56	3.20
23	25	Bond	191	80	2.14
24	25	Bond	207	59	3.52
25	25	Bond	209	54	3.85
26	25	Bond	220	75	2.92
27	25	Bond	254	65	3.92
28	40	Bond	268	59	4.53
29	25	Bond	283	75	3.81
30	none (sulph.)	Bond	116	37	3.13
31	none "	Ledger	120	25	4.80
32	none (alpha)	Bond	200	56	3.56
33	none (sulph.)	Bond	300	52	5.78
34	none (alpha)	Ledger	311	92	3.38
35	none "	Book	311	44	7.10

Averaged for Each Division

Fibers Rag Content Per Cent	Ratio Highest to Lowest		Range Stiffness Tear	Average Stiffness Tear
	Stiffness	Tear		
100	2.06	1.29	2.05 to 3.06	2.38
50 to 100	2.15	1.54	1.95 to 2.73	2.34
25 to 50	2.55	2.43	2.14 to 4.53	3.48
None	2.68	3.68	3.13 to 7.10	4.63

Graph III



of 3.67 is in the range of wood papers rather than of all-rag papers. This exception to the fiber rule only helps to confirm the close relation between fiber cementing and stiffness. Normally all-rag papers are beaten to high fibrillation but are protected by the long brushing act from excessive hydration. Rag fibers hydrate slowly and do not stiffen easily as do wood fibers. The particular paper in question had been beaten and sized to quite abnormal hydration and stiffness. It also showed by other tests quite abnormal strength properties. Paper number 9 is made of soft, worn rags but again excessively beaten for strength and was no doubt hydrated similar to a wood paper. Paper number 10 was made of equally soft worn rags but the light beat of a book paper was shown in the lower ratio of 2.68.

It is also interesting to note that papers 32 and 34 which are made of the high grade super alpha wood pulp which hydrates quite slowly but does not fibrillate as do rag fibers show the stiffness tear ratio of a wood paper indicating that, like with other wood papers, a larger percentage of its strength comes from hydration than does that of the all-rag papers for which the strength factor is so largely fibrillation.

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◆ Urge Plant Modernization and Equipment Purchases

Liberalization of banking practices in order to permit loans for plant modernization and purchases of new machine tools and other manufacturing equipment to be classified as productive loans instead of capital loans, was urged by Charles J. Stilwell, President of the National Machine Tool Builders' Association, in a recent statement.

Because of the outlays involved in the purchase of new machine tool equipment or in retooling, most manufacturers, and their bankers, have hesitated to make provision for new commitments in machinery and manufacturing equipment, Mr. Stilwell said. From these, should be excluded the automobile manufacturers, who have led the way in purchases of new manufacturing equipment despite adverse economic conditions, and whose plants are operated upon superbly efficient principles of speed and economy. Most others, however, under pressure of economizing, have allowed their plants to reach a high degree of obsolescence, with the bulk of the machinery that produced more than $70,000,000,000 worth of goods in 1929 still in place and operating at ever increasing costs in labor charges, frequency of breakdowns and repair charges.

"The revelation by the Machinery and Allied Products Institute that a pent-up demand for machinery worth eighteen and a half billion dollars, together with a prospective payroll of more than twelve billions in meeting that demand, have been built up during the depression years probably comes as no great shock to the bankers and the financial community at large," Mr. Stilwell said. "But it serves to press home the fact that a

substantial part of the machinery now in operation is obsolete and should be replaced by newer equipment in the interest of economy and efficient operation.

"Much of the new machinery and machine tools with which to build it involve heavy expenditures. Very few manufacturers, after the terrific punishment the durable goods industry has undergone, are in a position to finance such expenditures without banking help. The average banker in turn is not versed in the mysteries of production and the methods by which efficient levels of manufacture may be maintained. This is no more to be wondered at than the fact that the average industrialist is not well versed in many of the controversial banking subjects of the moment. The fact remains, however, that the average banker is far too apt to look upon the purchase of new machine tools as just another capital investment without giving sufficient thought to the self-amortizing values of such a machine. He does not recognize the savings in costs which can be effected by the introduction of up-to-date modern machinery, and its ability to pay for itself over a comparatively short period of time.

"Of course, the broad economic influences of modernizing America's vast production plant are incalculably constructive in every community and to every financial institution."

◆ Writers Dramatize the Story of Paper

The story of the manufacture of paper has been said to be one of the most colorful and romantic of industrial narratives. However, this story has only recently entered the realm of fiction. During the past year, several writers have chosen paper mill communities and their woodland operations as settings for some really very good novels.

Two of these works, "The Foolscap Rose," and its sequel, "The Foolscap Rose Unfolding," by Jos. Hergesheimer, appeared serially in *The Saturday Evening Post* prior to being released in book form. These stories dealt with the lives of several generations of a pioneer papermaking family. Although the characters are fictional, it is likely there is some historical basis for the theme of the story. As the lives of the characters unfold, the struggles of the early papermakers and their progress are very interestingly portrayed.

Another work of this character, "Come and Get It," by that well-known author, Edna Ferber, has for its setting a Wisconsin paper mill community. In her inimitable style, Miss Ferber has woven into this story a realistic picture of the papermaking industry in Wisconsin with a vivid story of the virtues and frailties of humanity. Her descriptions of the mills and her characterization of the lumber and paper king, as well as the old woodsman, are exceptionally good. Although the closing chapters of the story contain a rather depressing element of tragedy, yet the theme is carried out with perfect technique.

A novel "Product of the Mills," by Thomas Littlefield Marble, has just been published by Bruce Humphries, Inc., Boston. This story is woven around the lives of a conservative old New England paper manufacturer known as Peter the Great and his ambitious grandson, who is really Peter III, but is called "Peg," a name given him in his boyhood and coined from his initials. The theme of this story is character building as analogous to industrial growth and progress. In addition to the two Peters, there are Silsbee, a lawyer, Jane Talbot, architect and commercial artist, and Maxima Boisvert, singer. The ambitions and desires of these characters culminate, of course, in triumph, just as the spruce trees are dragged from the forest, driven to the mills and made into sheets of paper—all are product of the mills.

◆ Frank J. Tone Honored by Electrochemical Society

Frank J. Tone, president of The Carborundum Company, Niagara Falls, N. Y., has been awarded the Edward Goodrich Acheson medal by The Electrochemical Society. This is the second distinguished award to come to Mr. Tone in recent years, he having been the first recipient of the Jacob F. Schoelkopf Medal presented by the Western New York Section of The American Chemical Society.

The Edward Goodrich Acheson Medal was founded in August, 1928, by the late Dr. Acheson, the inventor of "Carborundum" and long recognized as an outstanding figure in electrochemistry. The award is made every two years to the person who shall have made a distinguished contribution to the advancement of any of the objects, purposes, or activities of The Society and is the highest honor which can be paid by The Electrochemical Society.

The award goes to Mr. Tone for his many and important contributions to the development and perfection of practical and commercial processes in the fields of electrochemistry, electrometallurgy and electrothermics, these contributions extending their benefits to the field of all useful arts.

◆ Paul E. Hodgdon Heads Deerfield Glassine

Paul E. Hodgdon, who has been associated with the Deerfield Glassine Co., Monroe Bridge, Mass., as general manager in charge of production, for the past four years, has been elected president and treasurer of the company. Mr. Hodgdon went with the Deerfield company at the time it first went into receivership. It has now cleared its receivership despite the depression.

Mr. Hodgdon has been associated with the paper industry for many years. He served several years with the Brown Company, both in Canada and this country; was eight years with the Eastern Manufacturing Company manufacturing fine Rag Bonds and sulphite pulp, and came to Deerfield from the Munising Paper Company of Munising, Mich., where he was general superintendent.

Charles N. Stoddard of Greenfield, Mass., for the past four years receiver of the concern, retains contact with Mr. Hodgdon, as Chairman of the Board of Directors. Richard J. Doolin, auditor, will be assistant treasurer under the new set-up.

◆ Razek Development Laboratories, Inc.

Joseph Razek, Ph. D., who is associated with the University of Pennsylvania, Philadelphia, announces that he has organized the Razek Development Laboratories, Inc., 430 Greenview Lane, Llanerch, Pa. The necessary apparatus has been installed and the laboratory is now ready for business.

Dr. Razek states that the laboratory is prepared to run spectrophotometric tests on transparent and opaque samples, reduce and interpret the data, and to make suggestions as to the way the data can be used, either in research projects or in setting up standards.

Dr. Razek is the inventor of the Razek-Mulder Color Analyzer. A two-part article by Dr. Razek entitled "Color Analysis and Specification" appeared in the June, 1934, and September, 1934, issues of THE PAPER INDUSTRY.

◆ Riehle Testing Machine Becomes Part of A. M. & M.

Riehle Bros. Testing Machine Company, Philadelphia, Pa., manufacturers of Riehle Testing Machines, has become a part of American Machine and Metals, Inc., according to an announcement issued by E. P. Holder, executive vice president of the latter organization.

Abbott F. Riehle will continue as general manager with headquarters at the new executive office address—100 Sixth Avenue, New York City. The Engineering Staff and key men have been transferred from Philadelphia to the modern 83-acre plant of American Machine and Metals, Inc., located in East Moline, Ill., where greater facilities will insure increasingly better service to users.

The American Machine and Metals, Inc., is the parent company of DeBothezat Corporation; Halliwell, Inc.; Oil Products Appliance Company; Tolhurst Machine Works; Trout Mining Company and Troy Laundry Machinery Corp.

◆ Gair Company Takes Over Androscoggin Pulp Co.

Robert Gair Company, Inc., New York, recently announced the acquisition by purchase of the plant and equipment of the Androscoggin Pulp Company, South Windham, Maine. Effective April 1st, the business will be operated by the Androscoggin Paper and Pulp Corporation, a wholly owned subsidiary of Robert Gair Company, Inc. The resident management will continue unchanged under E. K. Mansfield.

The Androscoggin mill is a modern paperboard and ground wood pulp plant. Its three paperboard machines produce standard types of paper box boards as well as special boards.

◆ Armstrong Cork Announces New Division

Organization of a Building Materials Division to provide greater concentration of sales effort on the company's products for the building field is announced by the Armstrong Cork Products Company, of Lancaster, Pa.

The new division will be headed by H. R. Peck who has a broad background of fifteen years of experience with the company. G. C. Denebrink, who has had wide experience in sales and merchandising activities of the company, will be assistant general manager of the division.

Six departments will be co-ordinated in the Building Materials Division. T. R. Nunan will be in charge of the Low Temperature Insulation Department which will handle the sale of corkboard, cork covering, and the materials required for their erection; J. L. Allison will head the High Temperature Insulation Department which will be responsible for the sale of insulating brick and other products used in industrial furnaces; L. E. Cover will be manager of the Temlok Department, in which will be grouped the fibreboard insulation products made by the company for residential and general building construction; H. D. Stewart will be manager of the Floor Tile Department; R. H. Craig will head the Acoustical Department; and J. C. McCarthy will be manager of the Lionwall Department, which will handle the sales of the company's linoleum-type wall covering.

◆ Weyerhaeuser Building New Pulp Mill

The pulp division of the Weyerhaeuser Timber Company has started construction of an unbleached sulphite pulp mill at Everett, Wash.

The new unit will have a daily capacity of 150 tons of high quality unbleached sulphite and is to be equipped with six 15-ton digesters. The product of the new mill will be available early in 1936.

◆ THE SALE OF all Taylor Stoker Equipment for Baltimore and Washington territories will hereafter be handled by the newly established District Office of the American Engineering Company, Keyser Building, Calvert and Redwood Sts., Baltimore, Md., Telephone Calvert 2167. Wm. M. Chatard will be in charge of the office.

◆ New Locomotive Plant Contract to Austin Co.

Acquisition of a 70-acre site for the new Diesel electric locomotive plant to be constructed by the Austin Co. of Cleveland for the Electro-Motive Corp., General Motors Corp. subsidiary, was assured recently when the Illinois Commerce Commission authorized sale of the property by the Indiana Harbor Belt Railroad Co. The site is in McCook, Ill., in the Chicago industrial district.

The plant will be the first complete factory for the exclusive manufacture of Diesel electric locomotives in the country. These locomotives will be powered with Winton Diesel engines manufactured in Cleveland by the Winton Engine Co., another General Motors Corp. subsidiary.

Nine buildings will be included in the plant which is to be of steel, concrete, brick and glass construction. All of the 2,000 tons of structural steel framework will be welded in the shop and field. This, according to G. A. Bryant, Jr., executive vice president of the Austin Co., represents an unusual application of heavy structural work.

◆ New Air Nozzle Designs

Two new designs of bronze air nozzles, each with renewable non-metallic discs, have been placed on the market by The Lunkenheimer Company, Cincinnati, Ohio. One of the designs is

made with an integral hose end while the other is made with a female pipe end. Either pattern can be furnished with pointed flat, or extension tip.

The discs are especially compounded for air service. To renew one of them is a simple matter. It is only necessary to unscrew the nut at the bottom of the nozzle, remove spring and old disc, insert new disc, and reassemble.

These air nozzles are recommended by The Lunkenheimer Company for the blowing of dust, dirt, chips, filings, borings, sand, lint, liquid deposits, and other matter.

◆ Carton Company Expands

The Eastern States Carton Corporation on April 1st moved its entire plant and offices to greatly enlarged quarters at 75 Front Street, Brooklyn, N. Y.

The plant was formerly located at 1 Main Street, Brooklyn. The new location contains 100,000 square feet of space for the company's equipment which has been doubled.

◆ Plibrico Acquires Beco-Turner Baffles

The Boiler Engineering Company of Newark, N. J., former builders of Beco-Turner Baffle Walls for water tube boilers, has discontinued business.

In the future, Beco-Turner Baffles will be installed by Plibrico Jointless Firebrick Company, Chicago. The engineering and installation personnel of the Boiler Engineering Company has been added to the Plibrico organization.

◆ Paper Filler Development

A gypsum product, after long scientific research and experiment, has been placed on the market by The United States Gypsum Company, of Chicago, for use as a paper filler. This filler, according to the manufacturer, can be used alone or in combination with other fillers to produce a brighter sheet, a better printing sheet, a sheet that can be run at a greater speed on the presses, and a sheet that requires less color in printing. In addition, a method for feeding which has been developed by the manufacturer and which is claimed to be entirely new is said to increase the retention of filler materially over conventional methods.

◆ Stainless Clad Steel Welding Ell

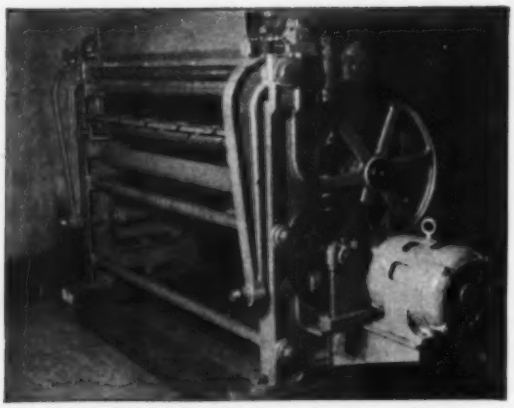
Midwest Piping and Supply Co., Inc., St. Louis, Mo., has annouced the development of a stainless clad steel welding ell. This ell is formed from a ply plate having a thin surface of stainless steel (18-8) on a foundation of mild steel. The stainless steel may be the lining of the fitting and thus protect the mild steel covering from the action of the fluid within, or it may form the outer covering in order to protect the inner steel from external corrosive conditions. Additional information on this development may be obtained from the manufacturer.

◆ DIRECTORS OF Blaw-Knox Company, Pittsburgh, at their recent organization meeting, created the office of Chairman of the Board. Albert C. Lehman, president, was elected to the new post in appreciation of his thirty years of service to the company since its inception. Irvin F. Lehman, vice-president who has also been associated with the company since its early days, was elected president, and Frank Cordes was made senior vice-president.

◆ C. B. NOLTE, formerly president and general manager of the Robert W. Hunt Company, Consulting, Testing and Inspecting Engineers, was elected president of Crane Company on March 26. Mr. Nolte succeeds J. B. Berryman, who had been president since 1931, and who now becomes Chairman of the Board.

◆ ACCORDING TO a recent press report, the Union Bag & Paper Co. intends to build a $4,000,000 plant at Savannah, Ga., where paper will be manufactured from slash pine.

◆ AT A RECENT meeting of the board of directors of the Detroit Sulphite Pulp & Paper Company, Dwight Stocker, for several years connected with the Detroit Sulphite Pulp & Paper Company, and recently assistant to the president, was appointed vice president in charge of production.



◆ Sheet Paster for Paperboard Industry

Charles E. Francis Company, Rushville, Ind., has placed upon the market a sheet paster, designated as new model C, for the paperboard industry. This paster is regularly built in 60 inch size and is equipped with 16 inch diameter applying rolls and 6 inch diameter driven doctor or scraper rolls. The crotch formed by the top applying roll and its scraper roll acts as a trough for the adhesive, and the bottom roll runs in a pan supplied with adhesive.

The scraper rolls can be adjusted accurately by means of adjusting screws, which are provided with inclosed springs, so that clearance is allowed for foreign substances which otherwise might damage the rolls. The top unit of the machine is counterbalanced to eliminate shock or bounce and to equalize the pressure applied to passes of various thicknesses.

Stock is stripped from the rolls by pairs of thin sharp-pointed spring steel fingers, which are ground to conform with the roll surface and set tangential to the roll.

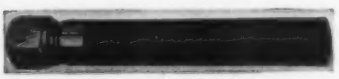
The machine is furnished either with loose and tight pulleys for belt drive, or is motorized. Likewise, a pump circulating system and storage tank is furnished where desired.

The manufacturer claims that this paster is the ideal machine for rapid production; that the surface speed of its rolls may be as much or more than 300 ft. per minute to match top speed of the operators; that either silicate of soda, starch or waterproof glue can be used with utmost economy; that boards can be built up to any desired thickness; and that mills which turn out work in comparatively small lots can also save a great deal of time and labor by its use.

◆ Automatic Hose Valve

A handy automatic hose valve for attaching to any free-end hose or overhead washer has been developed and is being manufactured by Hunt Manufacturing Co., 1619 Winona Avenue, Chicago.

The device has a brass female connector threaded to fit any standard water hose connection; a built-in and replaceable long-wearing valve and a six-inch ¾-inch gum rubber connection. By simply taking the hose in hand, the valve is automatically released, thus giving a free flow of water. When the hose is returned to its normal position, as hanging from an overhead washer or placed on the floor, the water pressure immediately closes the valve, making instant and positive shut-off of all water flow.



◆ Unit Heaters of Improved Design

A line of unit heaters, designated as Series 3, has been announced by the Fedders Manufacturing Co., Buffalo, N. Y. The manufacturer states that special attention has been paid to the factors of quietness and appearance. Streamline tubes, patented fins and sturdy cabinets combined with resilient motor mountings are said to eliminate resonance and to isolate vibration. Cabinets are electrically welded into one piece with integral reinforcing members providing strengths and rigidity.

This series of heaters is made in capacities up to 1,200 sq. ft. E. D. R. steam.

◆ D-C.-Type Motor Operates From A-C. Source

A new type of electric motor, which utilizes a "stationary commutator" and has the characteristics of a series-type d-c. machine but which operates from an a-c. power source, has been developed by E. F. W. Alexanderson, consulting engineer of the General Electric Company, Schenectady, New York.

The motor, known as a "Thyratron" motor, has a stationary armature and a revolving field of the type used in synchronous motors. The armature, however, is provided with a special winding. Undirectional current is supplied by means of a group of full-wave rectifiers which operate from the three-phase 60-cycle current source. The operation of the Thyratron rectifiers is controlled by means of grids in these tubes so that power is supplied to the motor windings in the proper sequence and amount necessary to give the required torque for operation. This control is obtained by means of a small distributor mounted on one end of the motor shaft. Speed control is obtained by varying the voltage supplied to the motor armature, by means of a phase-shifting device acting upon the same grids in the Thyratron tubes. Through this method, it is possible to obtain smooth speed control over the entire range for which the motor is designed.

The revolving field of the motor is connected in series with the neutrals of the armature windings and, as a result, the motor has the characteristics of the well-known series-type direct-current motor.

Because of these characteristics, motors of this type are applicable to such auxiliaries as fans, centrifugal pumps, compressors, and similar equipment having load characteristics such that the series type of motor can be used to advantage.

◆ Improved Design of Drum Barker

A new drum barker, designed with a view of eliminating the heavy repair costs attending the earlier type drums, has been announced by P. A. Paulson, Consulting Engineer, Appleton, Wis.

In this new design the circular wall or shell is made up of a series of parallel pipes which may be of wrought iron or steel. The ends of these pipes are fitted into holes in the outer peripheral portion of an end ring; the ends of the pipes being swaged into the holes to securely lock the pipes to the end rings.

Encircling the drum thus formed are a pair of track rings or tires that ride on rollers journaled on rocker arms which in turn are pivoted on pedestals. The pedestals are mounted on slabs of oak wood or rubber placed on cast iron sole plates. The rocker arms will permit the rollers to readily adjust themselves to any slight irregularities of the tires. The oak or rubber blocks will absorb the greater portion of shocks caused by the tumbling of the wood in the drum.

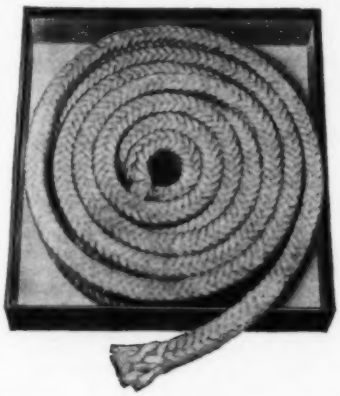
Each track ring or tire is formed with an internal web that is so shaped as to provide a circular group of saddles that grip and rigidly space the individual pipes of the group. In assembling, the two tires are mounted in properly spaced relation and the pipes are then entered endwise through the saddles of the two rings; afterwards the lower free portion of the saddles are swaged against the pipes to hold them tightly in place.

Encircling the drum midway between the tires is a ring gear. This also has an internal web formed with semi-circular saddles shaped to embrace the outer semi-peripheries of the pipes.

The drum is rotated by pinions fast on a shaft; the shaft being driven from any suitable source of power.

◆ Ungraphited Pump Packing

Greene, Tweed & Company, 109 Duane St., New York City, after extensive laboratory and actual working tests in pulp mills, have developed a pump packing that carries a lubricant containing no graphite. This lubricant is stated to be colorless, odorless and tasteless.



A working sample of the packing, which has been designated as Klero, may be obtained by writing the manufacturers. In requesting such a sample, it is only necessary to state the size desired.

◆ Synthetic Rubber-Like Plastic

A new plastic material, known as "Koroseal," has been developed by the Research Departments of The B. F. Goodrich Company, Akron, Ohio. This material may be molded into any shape and, according to Goodrich engineers, it resists the action of various chemicals injurious to rubber and possesses greater flexing life than rubber. Although the product is not expected to replace rubber in general use, it will find application in some instances where rubber consistency combined with superior resistance to certain oils and chemicals, or flexing is required.

◆ Noiseless Diaphragm Screen

A diaphragm screen that is designated as noiseless has been developed and is being manufactured by the American Paper Machinery and Engineering Works, Inc., Glens Falls, N. Y.

The mechanism for operating the diaphragms consists of a crank shaft and connecting rod which operates a reciprocating shaft extending the full length of the screen. The reciprocating motion is transmitted by connecting rods and bell cranks to all diaphragms, the diaphragms having a balanced movement.

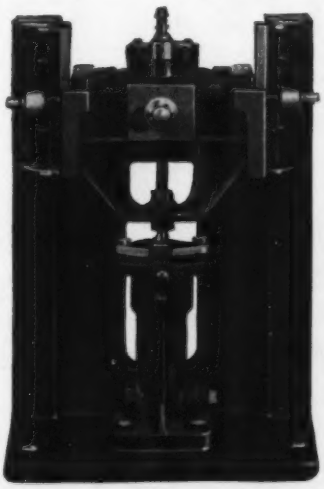
The crank shaft and connecting rod are equipped with ball bearings which are housed in an oil-tight crank case; while the bell cranks are mounted on roller bearings. All bearings are provided with Alemite connections.

Crank shaft, crank shaft bearings, reciprocating shaft, diaphragms, bellows frame, and vat are tied into one sturdy compact unit by a steel beam which extends the full length of screen. This beam is bolted every two feet to every cross member of the bellows frame.

This screen with .010 plates, according to the manufacturer, has a capacity up to 32 tons per twenty-four hours on some kinds of pulp. It is also claimed that only three h. p. are used to operate an 18 plate screen.

◆ Chemical Pump

A new plunger type chemical pump, developed especially for pumping exact quantities of water treating chemicals into water supplies at intervals depending upon the rate of water flow but adaptable to any type of liquid or semi-liquid chemicals and for close proportioning of coagulants, has been announced by the Dearborn Chemical Company, 310 South Michigan Ave., Chicago.



Stroke adjustment of the pump can be set from 0 to 3 inches. The plunger is of special alloy and all working parts are nickel semi-steel. The plunger and cylinder of pumps from ½ in. to 3 in. in diameter are interchangeable, the ½ in. cylinder operating safely up to 1800 lbs. pressure, the 1 in. to 1000 lb.

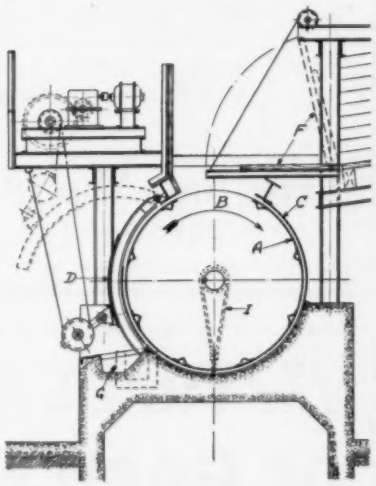
The pump, lubricated by modern pressure methods, may be operated by any type of actuating device such as chain or belt drive or electric motor. Its overall height is only 23½ inches.

◆ A New Log Barker

Fibre Making Processes, Inc., 8 South Michigan Blvd., Chicago, according to a recent announcement, has acquired exclusive manufacturing rights throughout the United States, Canada, and Newfoundland for the Waplan log barker.

This barker consists of a steel plate cylinder revolving unit with heavy end walls and journals through which the drum is suspended and driven by direct connected motor and speed reducer. The cylinder has an opening in it through which the logs are loaded and unloaded.

A stationary concentric steel shell, supported on a concrete foundation, surrounds the drum to prevent logs from dropping out through the opening in it



during rotation. In this shell, on the upgoing side of the drum, is a hinged door. This door is operated with a motor driven hoist; is provided with an automatic locking mechanism; and is used for discharging the barked logs into a pond or to a conveyor.

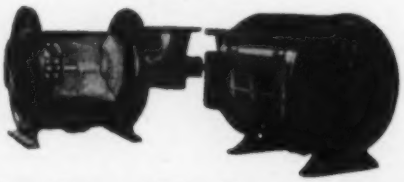
The bark drops out through the opening in the drum into a sluice connecting with a bark chamber from which the bark is removed by a scraper fastened to one journal.

Above the drum is a log bin, which holds a drum charge and is filled with logs by conveyor or crane.

This system or barking, designed for handling logs of any uniform length up to 16 feet, is already being utilized by a number of mills in Scandinavia and Finland. Among the claims made for it are: Saving in wood due to less saw cuts, less handling of wood, better chips on account of fewer ends, and cleaner pulp.

◆ NICHOLAS COLLIGNON, superintendent of the Imperial Coating Div. of Bryant Paper Co., Kalamazoo, Mich., passed away suddenly March 28, at the age of 58 years. Mr. Collignon had been employed in the Bryant mill since 1901.

Rebuild That Screen Room NOW...



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Increase Efficiency
Decrease Power

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PULP KNOTTERS
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METERING SYSTEMS

Trimbey Machine Works
GLENS FALLS, N. Y.

(From a Swedish answer to a French inquiry)

Holmens Bruks Fabriks Aktiebolag

Norrkoping, Sweden, Aug. 1, 1931

Edouard Hery,
Paris, France

Dear Sir:—

I have received your letter of July 22nd and beg in reply to say that we are very well satisfied with the TRIMBEY SCREENS of which we already have *five* installed. Besides, we have quite recently ordered *seven* more screens for our other mills.

Yours truly,

(Signed) GREWIN, Manager

Continued sales in Sweden and other European countries since 1931 attest to the service and popularity of
TRIMBEY SCREENS

TRIMBEY SCREENS have proven well suited for handling Kraft Pulp as is shown by their use in the following mills:

Brown Paper Mills Co.	Monroe, La.
Calcasieu Sulphate Paper Co.	Elizabeth, La.
Gulf States Paper Co.	Tuscaloosa, Ala.
Hummel-Ross Fibre Corp.	Hopewell, Va.
Brown Company	LaTuque, Que.
Brompton Pulp & Paper Co., Ltd.	East Angus, Que.
Wayagamack Pulp & Paper Co.	Three Rivers, Que.

The TRADE MARK OF GOOD FELTS

The Waterbury Felt Co.
SKANEATELES FALLS, N.Y.

For The Papermaker's Library

Papermaking Research Around the World, by Dr. Louis E. Wise.

Identification and Microscopy of Woods and Wood Fibers Used in the Manufacture of Pulp, by Ellwood S. Harrar and J. Elton Lodewick.

Lessons in Paper Making, Part 1, by Harry Williamson.

Lessons in Paper Making, Part 2, by Harry Williamson.

Practical Helps for the Mill Man.

Each one of these publications contains a wealth of information, and they are priced at only fifty cents per copy prepaid.

THE PAPER INDUSTRY
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◆ New Catalogues and Publications

American Hoist & Derrick Company, St. Paul, Minn.—Announcing its new American Gopher, Model 350, ½-yard crawler type shovel-crane-drag-line, for gasoline, diesel, or electric operation, this company has just issued a special descriptive catalogue. General specifications of the American Gopher and its outstanding features are fully covered in this catalogue. There are many illustrations, diagrams and dimensional data.

Binks Mfg. Co., 3114 Carroll Ave., Chicago—a new edition of Bulletin AD-114, 2-color, booklet, gives prices and descriptions of new additions to the Binks line of Spray Equipment. New developments described include the Thor Model 5 Touch-up Gun with adjustable spray head and overhead trigger and the Thor Model 6 Touch-up and General Utility Gun. Also included is the No. 5 Complete Touch-up Outfit with 6 extra cups, necessary hose and connections and handy metal tray.

Bulletin AD-114 briefly outlines the entire Binks line, including descriptions, prices and illustrations of spray guns for finishing, cleaning and oiling; cup-type containers, pressure containers, oil and water extractors, hose, air regulators, nozzles, compressors, portable spray outfits, spray booths and exhaust units. Helpful suggestions and technical information on the proper equipment for various users are suggested.

Brown Company, Portland, Me.—A new publication entitled "Paperight" is being published by this company. This publication has four purposes: To show actual samples of Brown company papers; describe the qualities of each paper to indicate its best uses; give mill production information on sizes, weights, etc.; offer the wide range of special papermaking fibers and experimental mill facilities in developing new papers for specialized needs. The publication will be issued at intervals of two months and sent to all the leading industrial companies of the United States.

Brown Instrument Co., Philadelphia—A folder containing specific information by which this company points out the advantages of its instruments for reducing costs in boiler room and plant process has just been received. The folder is well illustrated and will be sent on request.

Dominion Engineering Co., Montreal, Can.—A new and rational method of rating standard speed reducing gear units is fully described in a new catalogue just received. Tables from which users may select the most suitable units for their particular service are given, and the standard designs of speed reducing gear units available for prompt delivery are listed.

R. Fuess Inc., 245 W. 55th St., New York—A bulletin devoted to new paper testing instruments developed by Dr. Bekk, director of the Technical Laboratory, Ulistein Works, Tempelhof-Berlin in conjunction with Fuess engineers, has just been published. The instruments described and illustrated are: Paper-Surface Tensile Strength Testing Apparatus; Paper Scratch Tester; Measuring Microscope with Illuminating Device for Evaluation of Scratch Pictures; Measuring Microscope with Horizontally Moving Tube; Paper Hardness Tester; and Measuring Microscope with Scale.

Link-Belt Company, 2410 W. 18th St., Chicago—Two new folders have been issued by this company. No. 1459 is entitled "Steam Costs Go Down When You Install Link-Belt Automatic Coal Firing. Contains data on underfeed screw type stokers in sizes up to 300 b. hp. No. 1458, entitled "The Heating Plant Pays a Profit When You Install Link-Belt Automatic Coal Firing." This folder contains data on underfeed screw type stokers in sizes up to 300 b. hp. Copies on request.

Medart Company, 3500 DeKalb St., St. Louis, Mo.—A new 80-page catalogue, No. 56-G contains standard listings, weights and dimensions on this company's line of gears, sprockets and chain. The book is well illustrated, contains a vast amount of data and a number of tables and diagrams. Copies sent on request.

Montague Machine, Co., Turners Falls, Mass.—This company has just released a pictorial booklet featuring Montague tailor-made sets, anti-friction bearing applications on various kinds of machines used in the paper products industry, with suggestions as to where and how friction can be overcome to attain higher speeds. The bulletin also contains information concerning Montague Engineering Service. Copies and information on request.

Northern Equipment Co., Erie, Pa.—This company has published an illustrated paper by E. G. Grady, plant engineer of the Masonite Corp., on "Operating Experience at Masonite with High-Pressure Boiler Feed Control." The folder is designated as No. 137. The Northern Equipment Company manufactures the Copes System of Boiler Feed Control which is discussed in the article.

Norton Company, Worcester, Mass.—In a new booklet "It's Easy Now to Make Stairways Safe" this company shows the many applications of its Alundum rubber bonded safety tread. The booklet is illustrated and will be sent on request.

Plibrico Jointless Firebrick Co., Chicago—Beco-Turner Baffles is the subject of a new bulletin just released by this company. The bulletin deals with the various types of baffles clearly and concisely. The illustrations are in two colors. Copies on request.

Sherwin-Williams Co., Cleveland, Ohio—Through a new publication entitled "Guide to Profit Through Paint" this company attempts to put paint on a unit cost basis and to show the industrialists that properly approached the problem of painting a plant offers advantages in cost just as new machinery offers advantages over obsolete equipment. This booklet has been carefully compiled and is rather unique with its color effects and at this season of the year would be especially interesting to mill executives who are responsible for the renovating and painting of mill buildings and equipment. Copies may be had from the administration offices in Cleveland or through any of the company's branches.

Solvay Sales Corp., 40 Rector St., New York—A valuable piece of literature has just been issued by this company covering the subject of Solvay Liquid Chlorine. This publication contains chapters on the history, properties, uses and handling of Solvay liquid chlorine, with accompanying figures, graphs, sketches and other data. Chlorine in paper mills, is, of course, one of the major uses set forth. The booklet is illustrated and shows careful preparation.

Union Iron Works, Erie, Pa.—A broadside featuring this company's Union Radiant Heat Boilers has just been received. The descriptive material is amplified by a number of cross sectional drawings. There is also one page of testimonial expression from users of these boilers. Copies gratis.

U. S. Hoffman Mach'y Corp., 105 Fourth Ave., New York—This well-known company has just prepared for distribution a booklet entitled "Remove the Menace of Dust," which deals with the general subject of dust hazards in industrial plants. The construction details, and function of the Hoffman stationary type of cleaning system is clearly explained and illustrated in this booklet. There is also the Hoffman portable system which is advisable under certain conditions. The booklet is well prepared and printed in color. Copies will be sent to any mill requesting them.

BOOKS

The Chemical Formulary—Volume II, published by D. Van Nostrand Company, 250 Fourth Avenue, New York City, and edited by H. Bennett in collaboration with 109 chemical experts, is a companion book to Volume I of the same name. This book contains additional thousands of different products formulas than those covered in Volume I. These formulas are arranged conveniently under twenty-seven different section headings, among which is one section for the pulp and paper industry. A number of the formulas presented in this specific section are covered by some patent—the patent number and the name of country granting it being given in each case. Among the numerous other sections are individual sections on adhesives; cleaners and soaps; protective and decorative coatings; emulsions; fuels; ink, carbon paper, crayons; insulating and electrical specialties; lubricants, oils, etc.; materials of construction; metals and alloys; plastics; resins, gums and waxes; and textiles and fibers. The book contains over 500 pages of these formulas, the page size being 5½" x 8½". Its net price is $6.00 per copy.

The Finnish Timber and Paper Calendar 1934-35, compiled under the supervision of Onni O. Ojala, has now appeared. The new edition, the fifth, with the same general layout of material as earlier issues gives information in the first section on the forests, banks, railways, organizations within the woodworking industries and economic conditions of Finland. The second section covers sawmills; the third, plywood and spool industries; the fourth, cellulose, paper, mechanical wood pulp, cardboard and wall-board mills; the fifth, various contract forms in use at present for shipments of sawn timber, pit props, plywood, pulp and paper; while the sixth and concluding section includes information on shipping marks, table showing sawmills according to shipping districts and ports, and a review of the country's cellulose, paper and mechanical wood pulp mills according to products. The Calendar, priced at 12s. net, may be obtained from bookdealers or from the publisher direct—Finnish Timber and Paper Calendar, S. Esplanadgatan 2, Helsingfors, Finland.

National Directory of the Canadian Pulp and Paper Industries, 1935 edition, has been released by the publishers. This book of over 200 pages each 8¾" x 6" not only lists the pulp and paper mills of Canada and Newfoundland, but also includes pertinent statistical and historical information about the industry together with the factual data regarding water power in the pulp and paper industry as well as the forest resources of Canada. In addition, there is a listing of paper converters, pulp and paper distributors, fine paper merchants, coarse paper merchants, rag and paper stock dealers, manufacturers of paper goods, roofing asphalt manufacturers, stationery and envelope manufacturers, and miscellaneous paper goods manufacturers. Likewise, there is presented a directory of pulp, paper and allied organizations. The book, edited by J. N. Stephenson, and published by National Business Publications Limited, Gardenvale, Inc., is priced at $5.00 per copy.

Paper and Its Relationship to Books by R. H. Clapperton is a little book of fifty-six pages, with a page size of 3½" x 5⅞", that has been published recently by the Oxford University Press, 114 Fifth Avenue, New York City. The contents of the book cover a lecture delivered by the author before the London School of Printing as the fourth of the J. M. Dent Memorial Lectures. In this lecture Mr. Clapperton touches upon the history of paper making and discusses non-technically present day paper making raw materials as well as characteristics of book, writing and drawing papers.

U. S. Department of Commerce—Two new publications have recently been issued by the National Bureau of Standards. Commercial Standard CS49-34 contains recorded standards for Chip Board, Laminated Chip Board and Miscellaneous Boards for Bookbinding purposes. Misc. Publication M147 is entitled "Papermaking Quality of Cornstalks" by Charles G. Weber, Merle B. Shaw and Martin J. O'Leary is a study of the papermaking quality of cornstalks as made at the National Bureau of Standards. These bulletins are available from the U. S. Government Printing Office, Washington, at a price of 5 cents per copy.

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DRAINAGE SYSTEMS FOR DRYERS AND HEATING SYSTEMS
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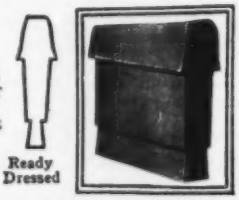

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in Quality of Mill Water Supply
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Simplified Outfits for Controlling Treated Water or in Analyzing Untreated Water for: Alkalinity . . . Chlorides . . . Dissolved Oxygen . . . Hardness . . . Phosphates . . . pH . . . Sulphates

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The *original* motor driven bursting strength TESTER

Rapid—Uniform—Accurate—

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The Original LONGCRIMP FOURDRINIER WIRES

Were made by this Company in 1922. Their outstanding service is known from coast to coast.

Our Modified Longcrimp is the latest improvement in that type of wires. It has the extra life of the original Longcrimp and can be used for light weight paper.

The Lindsay Wire Weaving Co.
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◆ Committee for Research on Lithographic Papers

The U. S. Bureau of Standards has been co-operating with the Lithographic Technical Foundation, Inc., in research on lithographic papers since 1930. This work was temporarily suspended for lack of appropriation in 1933, but was resumed in 1934. On February 20 the Advisory Committee of the Foundation met in New York with members of the staff of the Paper Section of the Bureau of Standards to discuss progress of this research and plans for the future.

Three reports have been published to date covering the studies made at the Bureau of Standards. Research Paper No. 480, "Register Studies in Offset Lithography," contains an analysis of the physical and mechanical causes of misregister. Research Paper No. 633, "Reactions of Lithographic Papers to Variations in Humidity and Temperature" is a report of exhaustive laboratory studies of temperature and hygrometric effects on the physical properties and dimensions of a number of experimental papers. These included machine finish papers made with different degrees of fiber treatment, surface sized papers, and coated papers. Research Paper No. 730, "Relation of Paper Properties to Register in Offset Lithography" covers actual printing tests of papers made with various degrees of fiber treatment.

C. G. Weber reported to the Committee the progress made during the past year. Further printing tests were conducted to verify the data given in Research Paper No. 730, which indicated that the best sheet from the standpoint of ability to maintain dimensions and to stay "in register" is made with a minimum of hydration and maximum fiber length. In addition, studies were made of various methods of conditioning paper prior to printing. As a result, new information has been obtained which appears to explain many of the register troubles encountered by printers and lithographers. Conventional paper-conditioning practice fails to take into account the hysteresis effect in adsorption and desorption of moisture. The information now available seems to indicate the practicability of a system of paper conditioning which takes advantage of the hysteresis effect to overcome continued expansion and distortion of the sheet during multi-color printing.

◆ Effect of Temperature on Bleaching Pulp

While in most bleaching operations a temperature of 35-40 deg. C. is considered desirable, the author has shown that in the case of pulp bleached with difficulty, or even with ordinary pulp, temperatures of about 55 deg. may be used with impunity. With these higher temperatures, the copper number is not markedly increased, and no appreciable loss in pulp yield results. Further heating (for example at 75 deg.) however is uneconomical. These conclusions were reached from data gathered in experimental mill runs. The increase in temperature speeds up the production, since, depending on conditions, the bleaching period in the hollander may be cut down from ½ to ⅔ of the normal bleaching time. Costs increase as well. If there is a preliminary bleaching period carried out at 35 deg. this increase in costs may not exceed 9 per cent, but in other non-stepwise bleachings the cost figures rose about 12 per cent. This increase in cost is due in the main not to chlorine consumption but to the additional steam used. The cost figures for certain individual runs were analyzed by the author, who also includes graphs and literature references to other leading articles. Herbert Rauchberg. Papier-Fabr. 32 (Sonderausgabe und Auslandsheft), 31A, 45-51 (1934).

◆ THE PRODUCT KNOWN in United States as Japanese rice paper or velvet paper is known in Japan as "Tsusoshi." It is obtained from the pith of the Tsuso plant (scientific name Tetrapanax pakynifera C Kock), an evergreen shrub indigenous to Formosa, South China, and the South Sea islands: "Tsusoshi" is used in Japan for the manufacture of wigs, dolls, artificial flowers, drawing paper, picture postcards, etc. Only the highest grade is used for making paper. So-called "mill ends" are mixed with other vegetable fiber to which chemicals are added and is pressed, the product being known as "Tsubo board." From it are manufactured clogs, hats, smoking sets, candy and cake bowls, carpets, picture frames, mats, etc.

"MIGHTY CONVENIENT and a darned good PIPE"

THERE isn't much we could add to this straight-from-the-shoulder opinion of a veteran paper-mill engineer . . . "Armco Spiral Welded Pipe is mighty convenient to get, and a darned good pipe." • It's convenient to get, because all you have to do is send in your specifications and Armco Spiral Welded Pipe will be "tailor-made" for your job and shipped promptly. • It's good pipe because it handles easily, goes in fast, induces high flow through its smooth inner walls, and really stands up in hard paper-mill service. • What more could you ask of pipe? The country's leading paper mills don't ask any more—and they show their satisfaction by using Armco Spiral Welded Pipe for most requirements. Try it just once; and you'll be convinced, too. Put your specifications into the mails today.

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Complete power plants to meet any operating conditions of Pulp and Paper mills or other Industrial service. Engineering and Construction.
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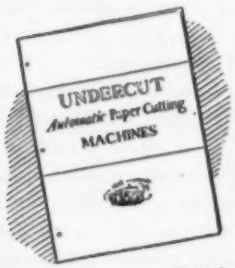

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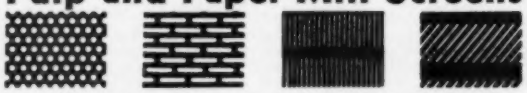
Pulp and Paper Mill Screens



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MONEL — CHEMICAL RESISTING ALLOYS
Perforations that are accurate in size and alignment
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The Paper Industry Safety Contest

July 1, 1934 to June 30, 1935

Scores as of February 28, 1935 (Cum.)

18 Mills Maintain Perfect Record

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A			
GROUP B	St. Croix Paper Co.	Woodland	Maine
GROUP C	Escanaba Paper Co.	Escanaba	Michigan
	Crystal Tissue Co.	Middletown	Ohio
GROUP D	Kimberly-Clark Corp.	Lakeview	Neenah, Wis.
	International Paper Co.	Webster	Orono, Maine
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	U. S. Envelope Co.	Morgan Paper Co. Div.	Lititz, Pa.
	International Paper Co.	Livermore	Chisholm, Maine
	Spaulding Fibre Co., Inc.	New Mill Plant	Milton, N. H.
	International Paper Co.	Riley	Maine
	U. S. Gypsum Co.	Gypsum	Ohio
	Spaulding Fibre Co., Inc.	Hayes	North Rochester, N. H.
	Mead Paperboard Co.	Rockport	Indiana

Division II—Remanufacturing

Container Corp. of America	Natick	Massachusetts
Texas Corrugated Box Co.	Dallas	Texas
Southern Container Co.	Houston	Texas
U. S. Gypsum Co.	Genoa	Ohio
Bemis Bros. Bag Co.	East Pepperell	Massachusetts

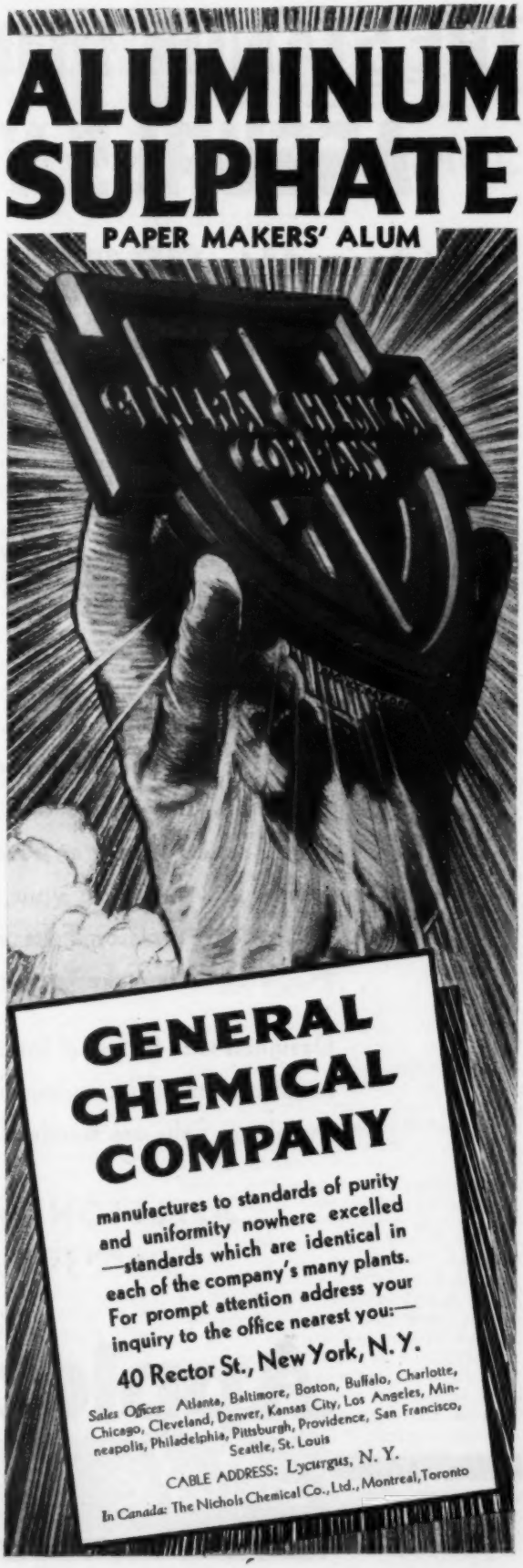
IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P- 27	1	10	5.270
	P-108	2	8	5.285
	P- 19	3	5	5.529
	P- 64	4	7	5.713
	P- 18	5	8	5.993
	P- 13	6	9	7.680
	P- 62	7	10	7.815
	P- 30	8	8	8.206
	P- 67	9	14	9.747
	P- 12	10	9	10.739
	P-114	11	15	12.244
	P- 44	12	12	12.327
	P- 31	13	14	12.584
	P- 1	14	20	14.559
	P- 95	15	13	14.984
	P- 69	16	16	15.180
	P-102	17	25	18.716
	P-101	18	17	19.853
	P- 2	19	20	22.571
	P- 28	20	70	24.908
	P- 87	21	29	25.237
	P- 78	22	25	27.361
	P- 74	23	47	45.745
	P- 71	24	53	60.492
GROUP B	P- 23	2	3	3.754
	P- 21	3	3	4.302
	P- 68	4	3	4.813
	P- 70	5	5	8.058
	P- 25	6	5	9.292
	P- 40	7	7	9.861
	P- 10	8	8	10.302
	P-112	9	7	11.377
	P- 11	10	6	11.960
	P- 22	11	10	17.335
	P- 60	12	11	17.399
	P- 45	13	14	20.056
	P- 46	14	10	20.737
	P- 16	15	13	23.882
	P- 26	16	16	25.242
	P- 77	17	13	26.631
	P- 76	18	13	28.763
	P- 82	19	18	29.312
	P- 32	20	18	29.601
	P- 73	21	22	33.328
	P-104	22	17	35.248
GROUP C	P- 72	3	1	2.296
	P-100	4	1	2.764
	P- 3	5	3	6.508
	P- 56	6	4	8.637
	P- 89	7	3	11.544
	P- 61	8	5	15.013
	P- 43	9	5	17.039
	P- 17	10	5	18.890
	P- 59	11	8	19.488
	P- 51	12	10	21.471
	P- 88	13	8	23.301
	P- 33	14	8	25.134
	P- 79	15	10	25.377
	P- 29	16	8	26.133
	P- 4	17	8	26.904
	P- 48	18	10	27.464
	P- 75	19	8	27.670
	P- 49	20	8	28.963
	P- 41	21	9	29.124
	P- 14	22	10	40.653
	P-113	23	13	47.576
	P- 47	24	23	67.483
	P- 50	25	24	96.058
GROUP D	P- 94	11	1	5.381
	P-109	12	1	6.553
	P- 6	13	2	8.944
	P-103	14	2	9.195
	P-110	15	1	13.612
	P- 42	16	2	17.050
	P-107	17	4	20.477
	P- 7	18	4	21.194
	P- 83	19	4	22.431
	P- 93	20	2	22.659
	P- 24	21	4	28.381
	P- 5	22	7	30.651
	P- 99	23	3	33.860
	P- 80	24	8	36.331
	P- 81	25	11	51.479
	P- 8	26	6	52.985
	P- 98	27	10	71.693

Division II

R- 6	6	4	5.554
R- 5	7	4	6.625
R-10	8	3	7.540
R- 3	9	1	8.244
R-16	10	2	8.711
R- 2	11	5	12.250
R- 9	12	4	19.191
R- 1	13	9	33.065
R-13	14	8	43.987

No January or February reports: P-83
No February report: P-73, P-76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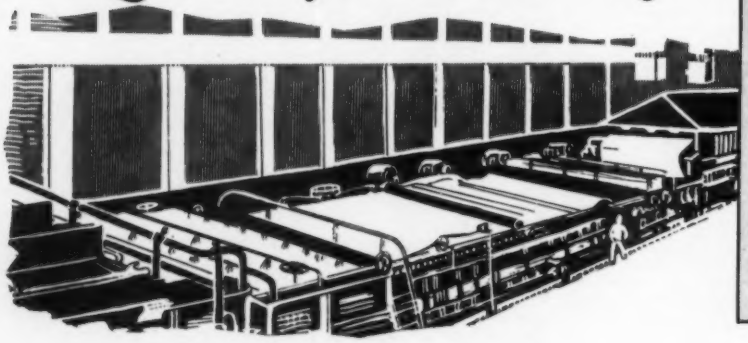

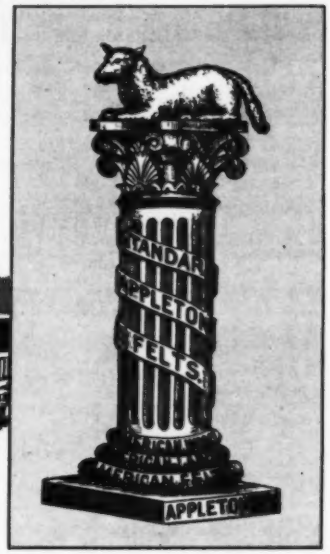

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This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Changing Governor Speed on a Corliss Engine

To change the speed of the governor of a Corliss engine the size of the pulley on the governor shaft should be changed. To find the required size of the new pulley multiply the diameter of the pulley on the governor shaft by the desired speed of the engine and divide the product by the present speed of the engine. The governor will run at about a certain height for a given governor speed, and in order to change the engine speed, the ratio of the governor speed to that of the engine must be changed. The speed of the engine may be changed by changing the counter weight on a weighted governor, but except for a slight change this is not advisable as it tends to throw the governor out of proper balance.

Several things may make the engine "hunt" or race for several seconds when the load goes off. Excessive friction of the cut off device caused by accidental straining of some of the rods or connections will tend to retard the governing action of the governor. These parts must be absolutely free from strain of any kind.

On most governors as used on Corliss engines, there is a gagpot or a vessel in which a plunger works in oil to steady the speed. There is some device by means of which the oil in the pot is allowed to pass from one side of the piston to the other through a small regulating valve which may be either outside of the pot or in the plunger itself.

By trial, this opening can be set at a point where it will allow the oil to pass through just fast enough to secure good regulation. If this setting is varied either way, racing or hunting will be the result.

As a general thing, a light machine oil is the best to use in the gagpot and sometimes it is necessary to add kerosene also in order to secure the best results.

The earlier types of governors for Corliss engines were of the flyball type without counterpoise. These governors are not so sensitive to speed changes as those with a dead weight counterpoise and lighter weight balls which depend on a high rotative speed to secure close regulation.

When the load is suddenly thrown off, this governor does not respond rapidly enough and the engine speeds up before the governor can control it. The excessive speed naturally increases the speed of the governor several revolutions when the extra centrifugal force throws the flyballs too far outward where they revolve in a new plane, in which position cutoff takes place too early, and the engine slows down.

This oscillation above and below normal speed goes on for several seconds until the engine again comes under control. It is entirely possible that the racing is caused by a combination of these causes.

◆ WITH STEAM TURBINES, the advantage gained by reduction of back pressure is more marked than with the reciprocating engine, though theoretically the same for the same range of expansion. Initial condensation, leakage past valves and other sources of loss prevent a reciprocating engine from benefiting from a good vacuum to the same extent as a turbine, and the cost of the larger cylinder to take advantage of high vacuum is prohibitive.

◆ What is the Proper Water Level?

Many engineers firmly believe it more economical in coal consumption to carry the water in their boilers quite high. The theory advanced by them is that with an extra supply of water in the boilers, it is unnecessary to introduce comparatively cold feed during the time the boiler may be most heavily drawn upon for steam, thus allowing all available heat to be used for steam generating purposes rather than for heating the feed water.

With the water in the boiler quite near the bottom of the gage glass and a load coming on, much of this water will be evaporated, necessitating the rapid introduction of comparatively cold feed water. This requires the coal to supply heat not only for converting that water already in the boiler into steam, but also for raising the temperature of the feed water then introduced to that of the water already in the boiler. As a consequence, more coal is naturally required.

If water is carried quite high, a heavy load can be carried for some little time before any more water must be fed to the boiler, all the heat of the fuel being available for steam generating purposes only. Then, as the load gradually decreases, advantage may be taken of the available heat in the heavy fires by restoring the water level. In this way, namely, that of feeding the boiler light during heavy loads and heavy while the load is dropping off—a maximum amount of water may be evaporated with a minimum amount of coal.

Of course, if the load does not vary and just sufficient feed is introduced to make up for the water being converted into steam, it is immaterial whether the water in the boiler is near the bottom of the gage glass or near the top.

◆ Care of Slip Rings

Care of slip rings is quite as important as that of the brushes, and many cases of trouble can be attributed to the lack of this care. A ring which is rough or eccentric will prevent good contact being made. This is particularly true of rings which operate at high peripheral speed. Vibration will naturally produce similar results. Rough or eccentric rings should be turned or ground, and causes of vibration should be eliminated. Even in the best balanced high-speed machines the vibration is sufficient to cause appreciable variations in contact pressure, and for this reason it is standard practice to employ not less than two brushes on any ring placed at different points on the circumference. If any one brush tends to leave the ring, the others may remain in contact to carry the current.

Where direct current is used for the excitation of synchronous machines, it has been found in some cases that there is a tendency for one ring to pit; this usually occurs at one or two points on the periphery. Practically all cases of this kind have been reduced to imperfect contact conditions between the brush and ring, either from vibration or from the ring not being perfectly true. The pitting is the result of arcing at the point where the brushes leave the ring. The trouble may be reduced somewhat by reversing the current occasionally, but to prevent its re-currence the mechanical conditions should be corrected. It has been found that this tendency is much less for metal-graphite brushes than for carbon brushes and in consequence the carbon brushes on the rings of synchronous condensers, etc. have been replaced in a number of cases with a semi-metallized brush with a great improvement. Trouble of a somewhat similar nature has occurred on small induction motors and synchronous converters furnished with carbon or graphite brushes, as is often indicated by burned streaks on the ring surface due to sparking. Semi-metallized brushes may prove the solution in these cases as well.

8

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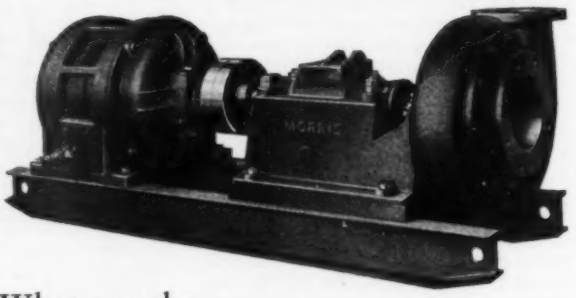

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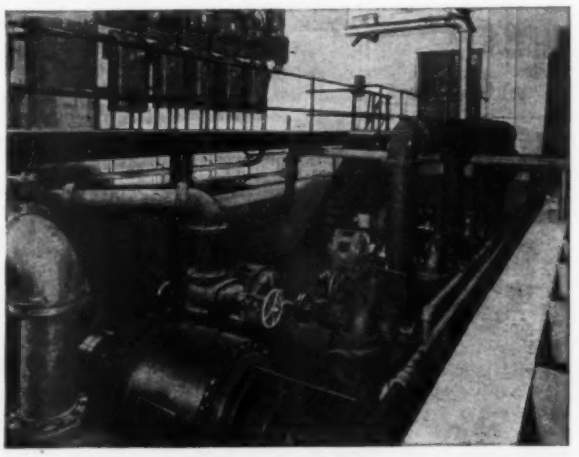

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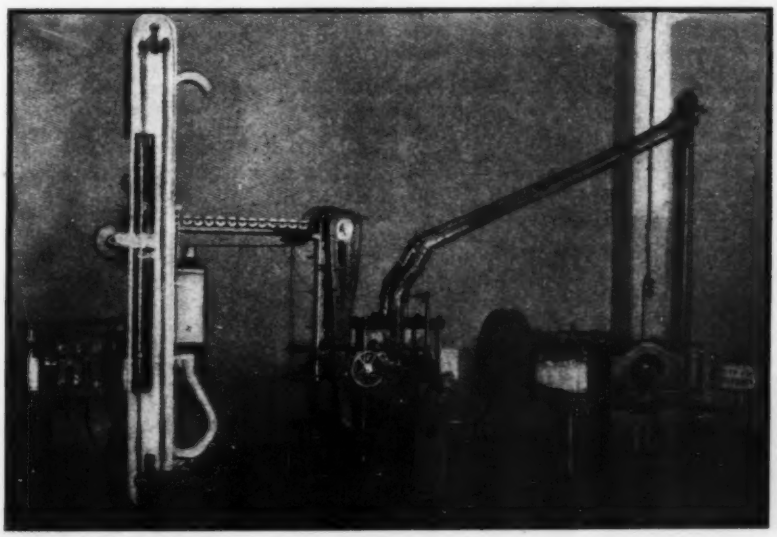
TECHNICAL DEVELOPMENTS

IN THE PAPER INDUSTRY

The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

◆ Milk Bottle Manufacturing Machine

The three carefully synchronized machines shown in the illustration are entirely automatic. Whereas the principle involved is simple, the machinery was evolved only after several years of research. The machine at the left uses rectangular paper sheets (Weight 150-170 grams per meter) or a paper reel in the manufacture of cylindrical paper tubes that are open at either end. In the case of the stacked sheets, the top one is coated over in a certain area with casein size, and is then conveyed to and wound on a revolving iron core. The cylindrical paper tube thus formed is shoved forward over the core (by the use of a gripping device) through a distance identical with its own length. At this point there is stamped upon it whatever printed matter is required for the finished container, using suitable aniline dyes in the printing process. Thereupon the paper tube is ejected downwards and travels on a conveyor chain through a drying chamber, in which the joint is dried by the use of heated air. While the first tube is being printed the next one is being shaped on the core. During this process, as shown in the right of the illustration, there are being punched out bottom and top discs, which are to serve as ends for the paper container. These discs are made of cardboard (weight 625 grams per sq. meter) shown as a reel on the left of this section of the machine. A device serves to form a low rim on one cover, and a round hole is punched in each of one series of the discs, which later serves as the filling inlet for the milk container. These two sets of carton discs are picked up and conveyed separately and at just the proper rate of speed (by the overhead conveyor shown in the illustration) to the central machine. Simultaneously the paper tubes are conveyed from the dryer to this same machine. Here each open paper cylinder is stopped in a certain position, tightly gripped, and its inner surface at either end is coated to the depth of a few millimeters, with casein size. Suitable rubber wheels are used for this purpose. Thence a series of grippers carry the tube to a point directly opposite two carton discs which are pressed into position by means of stamping devices. This operation completes the container which then drops into a basket or which may be carried further to a point at which the bottle is filled with milk. Sufficient time is of course given to allow the casein seals to dry properly before filling. The round hole in the top of the bottle is closed by means of firmly fitting caps made of carton identical in nature with that of the carton ends. However a special sealing machine is unnecessary. The claim is made that a bottle cannot be opened or refilled without leaving earmarks of tampering. The milk can be poured out by pressing at a certain point below the top lid, or may be sucked up through a straw. Neither the paper nor cardboard used in the process are paraffined. The waterproofing qualities are obtained in the beater through a special treatment (which is not described—translator). Evidently the materials are entirely hygienic. Detailed materials and labor cost data are given. The significant suggestion is made that larger dairy farms would acquire their own bottle-making machines, thus obviating the transportation of empty containers. The inner walls of the bottles remain untouched by human hands and are tight, dustproof, and lightproof. Milk, it is pointed out, can be cooled more rapidly in paper than in glass bottles under similar conditions. Anonymous; Wochbl. Papierfabrik. 65, No. 26, 464-66 (1934).



◆ Electrical Method for Moisture Determination

The Heppenstall apparatus consists of a source of current, an ammeter, and an electrode pair. The paper to be tested is so placed that by turning a crank, the points of the electrodes are pressed into the sheet. Thus the electrical conductivity is measured and the moisture content read off directly from a specially prepared graph which correlates conductivity with percentage of moisture. The results compare favorably with those obtained by oven-drying the samples. Anonymous, Zellstoff u. Papier, 13,441 (1933); through Papier-Fabr. 32, No. 3, 33 (1934).

◆ Limestone Testing in Sulphite Manufacture

Various limestones were examined with a view towards their successful utilization in the sulphite pulp industry. The method of testing suggested by Remmler which depends on the solution of limestone in sulphurous acid is evidently inadequate. In their tests, the authors used a tower 60 cm. in height and 3.5 cm. in diameter, and containing 500-600 pieces of limestone. Ten liters of a sulphurous acid solution (concentration not given) is poured through the tower six times during the course of one hour. The temperatures at which these experiments were carried out were 4 deg., 14-16 deg. and 22-23 deg. C. respectively. Subsequently the solution and the residue were examined for sulphurous acid and for sulphuric acid. The results indicated that poorer qualities of limestone can be used more satisfactorily in towers provided with two grates. In summer it is best to lead the gas through a smaller number of towers, and to allow the aqueous solution to trickle through the limestone for longer time periods. The method gives a means of determining the percentage solubility of the limestone under the conditions cited. Kagan and Lipschitz; Arbeiten des allrussichen Institutes für die Papier u. Zellstoffindustrie, No. 1, 11 (1934), through Papier-Fabr. 32, No. 40, (Auszüge) 51, (1934).

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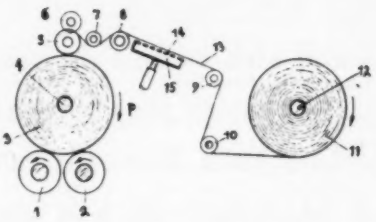
◆ Rewinder

Traveling from roll (11) over the various guide rolls, (10), (9) (8) and (7), the paper sheet (13) makes contact in a certain area [between (8) and (9)] with the slotted surface (14) of the suction box (15). This box and its surface are the features of the patent. From (7) the sheet is led between rolls (5) and (6) provided with slitters, and thence to roll (3), which is supported on the rolls (1) and (2), which also provide the drive. Box (15) has inner



partitions, thus forming interior compartments which are fitted with appropriate suction pipes and devices, permitting the regulation of the vacuum. As sheet (13) moves forward, pulled by (3), there is only a very slight tension between (11) and (14). On the other hand, between (14) and the rewinder roll (3), the sheet is kept under a constant even tension, that is sufficient to insure winding a hard reel. Jagenberg-Werke., A. G. German Patent No. 601,816; Kl. 55c.

◆ Lignification, Lignin and Fluorescence

Figure 1 shows the fluorescence microscope used in the experiments. (B) is an arc lamp and (R) are ribbed cooling devices housed in a simple sheet metal container, open at the top. (C) is the condensor lens, (K) a cell containing copper sulphate, (S) a black glass filter, (P) a parabolic mirror, (V) a shutter and (O) the stand holding the entire equipment. The technique of observing and photographing fluorescent fibers is described in some detail. The gradual development of lignified membranes was carefully studied in the case of monocotyledons, dicotyledons, and gymnosperms, both through the intensity of fluorescence, and by the more common color reactions. As a result, the hypotheses of Ziegenspeck [Bot. Arch. 9, 297 (1925)] regarding the formation of the products termed amyloid and collose were substantiated clearly only in the case of the monocotyledons. Their demonstration was difficult in the case of dicotyledons, and they seem to be entirely absent in the gymnosperms, e.g. Scots pine. It was shown (again) that there are marked differences in the sites of coloration of the phloroglucinol test and the Mäule reaction. The former gives the strongest color in the middle lamella; the latter appears in the secondary layer of the wood and the bast fibers. A very interesting by-product of the study gives a clean cut method for the isolation and determination of lignin, especially in the case of coniferous woods, by means of the Fredenhagen and Kadenbach method which uses 100 per cent hydrofluoric acid in the hydrolysis of cellulose [Cf. Ang. Chem. 46, 113 (1933)]. In contrast to the usual sulphuric acid or hydrochloric acid methods, the hydrofluoric acid reaction is much more rapid and requires only 0.5 hour. The wood (e.g. Scots pine) is cut into small cubes 2-3 mm. on edge, with carefully smoothed surfaces. These cubes are extracted with alcohol-benzene (1:1) until the intensive blue-white fluorescence of the rosin has disappeared. The samples were then dried at 105 deg. C, and used in the analysis. Normally they weighed 0.3-0.5 grams, but accurate results have been obtained with as little as 0.037 gram. The cubes are placed in a silver dish, covered with 15-20 cc. anhydrous hydrofluoric acid, which, after standing 10 minutes, is cautiously decanted off. This treatment with 10 cc. of HF is repeated twice. The decanted acid remains clear, and no precipitation occurs on pouring into water. The deep-brown or violet colored residue is washed with water until free from acid (methyl orange indicator) and the moist residue is dried, first at 80 deg. C. and finally at 105 deg. This is lignin residue. Even when this is subjected to further treatment with HF there is no decrease in weight. Wood taken from the first five annual ring zone adjacent to the cambium showed 28.6 per cent lignin while wood taken from between the 130th and the 135th annual rings (also adjacent to the cambium) yielded 27.7 per cent. Differences between the lignin content in various parts of the bole are discussed. The above method while readily carried out in the case of softwoods, must be modified very materially in the case of hardwoods, and for these modifications the reader should consult the original. In coniferous woods the original structure is kept during the isolation, and the resultant, small lignin blocks may

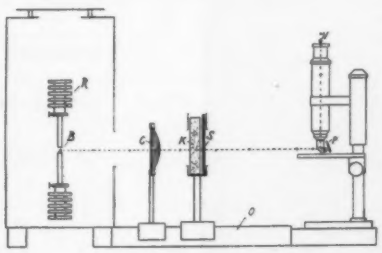


Figure 1

be cut with a microtome without imbedding in paraffin. Apparently, both the fluorescence of freshly cut lignin and the phloroglucinol test that they give serve to characterize the material, although the fluorescence colors are not identical with those shown by freshly cut wood sections. The differences noted above between the phloroglucinol test and the Mäule reaction are attributed to an unisolated body (termed Xylin) which is evidently dissolved or destroyed by hydrofluoric acid. This xylin seems to be absent from all gymnosperms (other than the Gnetaceae) but is present in all the angiosperms examined. It seems to account for the fluorescence pictures obtained after treatment of a section with ammonia. During the process of lignification, fluorescence appears to be directly correlated with the concentration of lignin, up to a certain point, and fluorescence colors are a much more delicate gauge for incipient lignification than are the ordinary color reactions like phloroglucinol. However when lignification has reached a high stage, these fluorescence colors may be blotted out. Tannins and other extractives of the wood also alter fluorescence very markedly. The author gives 26 interesting photomicrographs of fluorescent sections, as well as graphs showing the relation between progressive lignification fluorescence, and the phloroglucinol test. Figure 2 gives the fluorescence picture of a lignin skeleton. Otto Eichler; Cellulosechem. 15, Nos. 11-12, 114-124 (1934); 16, No. 1, 1-7 (1935).

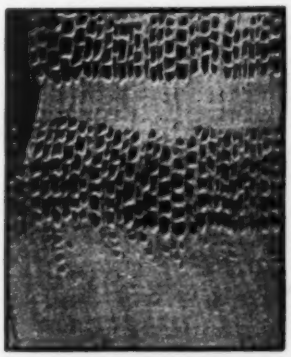
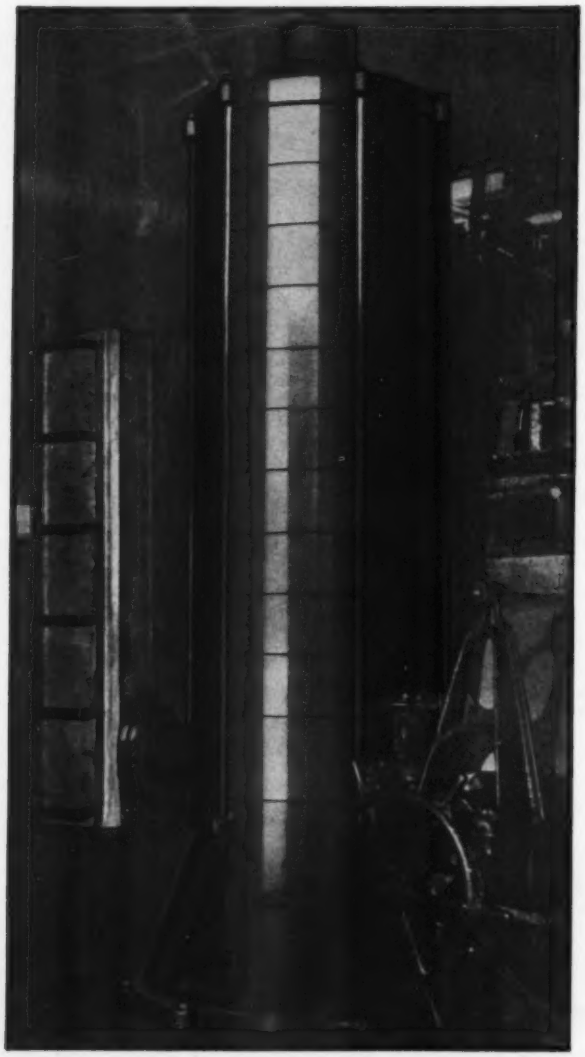


Figure 2

◆ New Method for Determining Cellulose

The so-called cellosans and other polysaccarides which are so often intimately associated with the actual cellulose, should (in the authors' opinion) remain intact and be determined in any satisfactory method for estimating cellulose. Alkaline pretreatment is objectionable, despite the fact that it helps in the delignification, in that it removes a portion of the cellosans. Alternating treatments with alkali and acid also caused a marked loss in cellosan, and when followed by neutral hypochlorite, failed to yield a lignin-free product. In the chlorination methods for cellulose, chlorine plays the role of a solvent (during the subsequent hot sulphite treatment) as well as a delignifying agent. Sulphite alone causes far-reaching but incomplete delignification. Apparently the goal of adequate delignification is practically attained by coupling sulphite digestion with hypochlorite treatment. The following new method is applicable to either wood or straw:—the material is subjected twice to alternate treatments with neutral hypochlorite, followed by boiling sodium sulphite solution, and thereupon is treated with acid

You Are Being Robbed



every minute of each 24-hour day that you prepare your stock for the paper machine without FRITZ REFINING AND HYDRATING MACHINES. At least two insidious forces are always at work to reduce profits and to sometimes diminish them to the vanishing point. These forces are excessive power costs and a quality of product not commensurate with possibilities. ◆ FRITZ REFINING AND HYDRATING MACHINES in your mill will prevent these thugs from doing their stuff. Through their installation power costs for refining your stock will be reduced and quality of finished paper improved. ◆ Do such claims sound too good to be true? Let us prove them to you. ◆ Write

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hypochlorite alternating with hot aqueous sodium sulphite. These last treatments are repeated if necessary two or more times. The results check well with those obtained by the Cross and Bevan method when no pretreatment was used. The new method is far more rapid than that of C. and B. and is recommended where an entire series of determinations is required. The cellulose residues obtained from cereal straws by either method are never quite free from lignin. However, it is clear that the lignin figures obtained by treating the so-called cellulose with 72 per cent sulphuric acid are unreliable, since evidently the cellosan portion may give rise to lignin-like substances. When the straw was subjected to a short pretreatment with dilute acid, the lignin figures dropped 25-30 per cent. Similarly the lignin figures for heartwood appear too high. A. G. Norman and S. H. Jenkins. Biochem. J. (London) 27, 818 (1933); through Papier-fabr. 32, No. 32, (Abstracts) 21 (1934).

◆ High Efficiency in Cylinder Drying

Reference is made to Austrian Patent No. 137,585, granted to G. Kienzle. At the dry end there are two rows of cylinders arranged one above the other. The upper row does not vary from the usual design, but the lower row consists of strongly built sieved cylinders whose mantles are perforated or slitted. Hot air blown into the interior of such a cylinder is ejected through these mantle openings, removes the moisture accumulated in the paper web (while this web was on the preceding cylinder) and serves for more effective drying on the cylinder immediately following. This represents an increase over the usual drying efficiency and utilizes a principle already known and applied in the drying of dryer felts. In contrast to the above,

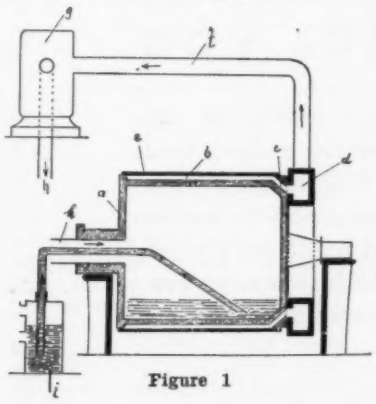


Figure 1

the author discusses the attempts made to remove moisture from the inner layer of the paper web by means of suction devices, which in general have proved unsatisfactory. However a useful method of increasing cylinder drying, through suction was evolved and patented by E. F. Sundström of Sundsvall and K. L. Sundström of Norrviken. Their method is shown diagrammatically in Figure 1. Here the water is removed from the cylinder side of the sheet (e) by means of the cells (b) arranged closely together as rills running parallel to the axis of cylinder (a) and evenly distributed over the cylinder surface (Cf. Figure 2). Although these cells are sealed at one end, they are connected at the other end with the stationary cylin-

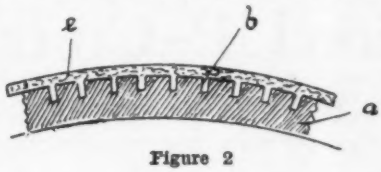


Figure 2

drical suction-box (d) by means of channel (c). From (d) the water-vapor is removed through a conduit (f) to a suction device (g) which may serve as compressor and condensor. Pipe (h) from the outlet of (g) can be connected to the steam-intake of (a) and can function in heating the latter. Condensates of (a) are drawn off and accumulate in (i). Although the cost of manufacture and of erection are somewhat higher, the Sundström system offers advantages such as simplification in aeration and ventilation, since the steam system is entirely closed. Steam expenditures are also cut down and drying efficiency is gained. It may also be possible to decrease somewhat the temperatures within the cylinders. S. W. Wochbl. Papierfabrik., 65, No. 46, 818 (1934).

◆ Adsorption and Swelling of Cellulose

Cellulose (in the form of cellophane) has what appears to be an isoelectric point. In other words, for a specific form of cellulose there is a definite pH, at which neither hydrogen ions or hydroxyl ions seem to be adsorbed. To the author this appeared anomalous since he had shown previously [Cellulose Ind. (J. Cellulose Inst. Tokyo) 7, No. 1 and 2 (1931)] that cellulose, irrespective of whether it is placed in acid or in alkaline medium, always carries a negative charge. Therefor the isoelectric point is not an actual one, and cannot be compared with the true isoelectric points of proteins, etc., i.e. a pH beyond which the charge on the particles changes. This is evidenced by the fact that this false isoelectric point does not coincide with the pH at which minimum swelling occurs. The explanation of the phenomenon is summarized as follows:—at the false isoelectric point water and H-ion are absorbed in the same ratio in which they occur in the medium surrounding the cellulose (hylotropism as it was termed by Ostwald). This means that no change in pH of the outer medium can be detected. This hylotropic adsorption takes place at varying hydrogen ion concentrations, depending on the origin and the pretreatment of the cellulose. $AlCl_3$ is the only electrolyte of those tested that was capable of causing a reversal of charge on the cellulose and in this system the author finds a true isoelectric point, coinciding (as it should) with that of minimum swelling. K. Kanamaru. Kolloid Z. 66, 163-175 (1934) through Papier-Fabr. 32 No. 44 (Auszüze) 69 (Nov. 1934).

◆ Cellulose Sols of Definite Viscosity

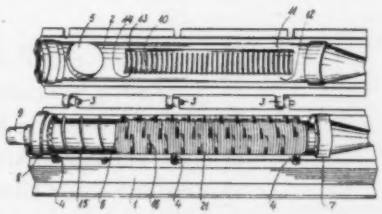
Recognizing the experimental fact that even minimal amounts of oxygen can lower the viscosity of cellulose solutions very markedly, it was shown that such sols (having a definite and adjustable viscosity) may be prepared. The oxygen originally present in materials used in the sol formation is carefully removed. The resulting sols are then kept free from light and oxygen until their viscosity is to be adjusted. This is accomplished by the addition of very small but carefully measured amounts of oxygen or of compounds containing active oxygen. Dr. E. Scheller and the Deutsche Gold- u. Silberscheideanstalt, vorm. Roessler. Frankfort a. M. German Patent No. 607,974; Kl. 29b.

◆ Impregnating Pulp Objects With Latex

Fiber objects are treated with latex, mixed both with a protective colloid like a plant gum (to increase viscosity) and with an explosion-proofing material, like water glass. The impregnated fiber is then heated at pressures above 50 atmospheres. Juan Duarry-Serra. Barcelona, Spain. German Patent No 605,-785.

◆ Fiber Separator

A device, the object of which is principally the preparation of fibrous material from wood shavings, straw, wool-waste, etc., consists of a hollow stationary cylinder, the lower part (1) of which is fastened to the upper part (2) by means of the joints (3) and the bolts (4). The opening (5) admits the fibrous substance; (6) is an outer cylinder roll, connected with the bearings (7) and



(8) and driven through shaft (9). Over about one-half of its length the inner drum (1-2) is provided with wedge-shaped ribs (10) narrower at (13) than at (14), and so arranged that there are 2 slit-like openings (11) and (12) running in the direction of the axis. Corresponding to that position of the stationary cylinder which is ribbed, the revolving cylinder is also provided with ribs (16) fastened to platelike rings (21). The claim is made that the protruding ribs (16) of the revolving drum exert a springlike pressure against the lateral faces of ribs (10). Olof Kristoffersen. Oslo. German Patent No. 608,-115; Kl. 55c.

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The COMMERCIAL OUTLOOK

New York, April 1, 1935.

THE paper industry as a whole is enjoying fair activity, with some branches in a decidedly livelier condition than others. Generally, demand for paper and board is developing steadily and in moderate volume. There is much room for further improvement, yet in the aggregate the movement of paper from mills to consuming or converting centers is comparatively large. Opinion is common within the industry that were business allowed to proceed along its way unhampered and unperturbed, considerable broader activity would be registered in the paper trade. As matters are, the uncertainty growing out of the Congressional situation in Washington, and the unsettled political conditions abroad, are without question serving to hold business in check, and the paper industry is feeling the effects along with other basic manufacturing industries.

In other words, were conditions marked by less uncertainty, there seems no doubt industrial and trade activity would forge ahead to greater lengths. However, consumers with few exceptions, and also wholesalers, jobbers and others, are buying in a very cautious manner; seldom are they looking ahead in acquiring supplies. Certainly this is the case in the paper industry, where there are ample signs purchasing is confined almost exclusively to current requirements, with consumers and converters in no mood whatever to lay in stocks. This buying policy, of course, acts to curtail the volume of purchases, with the result mills are not securing the tonnage of business they probably would under other circumstances.

At the same time, the demand is of the very healthiest variety, since the paper and board being bought is moving almost directly into consumption. So long as this situation exists, there will always be the possibility of something occurring, or conditions suddenly changing to bring buyers flocking into evidence not alone to increase their takings against more or less immediate needs but to accumulate supplies for forward use. Yet while buyers continue possessed of the belief there is little likelihood of prices moving upward against them, the present method and scope of purchasing probably will remain.

That business in general is gradually though persistently pulling out of the depression is usually acknowledged, despite some setbacks of what appear to be temporary character in some quarters. Industrial production holds at a fairly high rate. The output of automobiles for the first quarter of this year was at an indicated rate larger than in any corresponding period since 1929. Activity of steel mills has subsided to a degree, and textile mills also have slowed down. Nevertheless retail sales figures are encouraging, and statistics covering the United States export and import trade are highly gratifying. Predictions of some industrial and business leaders for later this year are of a glowing nature, and the belief of the average business man is that trade activity will show further expansion after Congress has finished its labors and provided some degree of stability is reached in conditions in foreign countries.

Operations of fine paper mills have been stepped up to some extent as a result of Government paper orders. Newsprint mills are well engaged, continuing to show increases in production over last year notwithstanding the excellent gains in output of print paper during 1934 over the preceding year. Wrapping and book paper manufacturers are fairly busy, and tissue and specialty mills are getting a moderate volume of orders. Board mills are in an enviable position; while their tonnage of business is not all that could be desired, it is said they are operating on a very profitable basis.

Newspaper advertising increased 4.9 per cent in February over the same month a year ago, the Advertising Age reports after a survey of 81 cities. Nine per cent gain in retail advertising was disclosed. General advertising increased 1.3 per cent, while automobile advertising showed a loss of 1.7 per cent compared with last year.

The output of newsprint in Canada during February continued to show an increase over the similar month of 1934, but production in the United States in February registered the fifth consecutive monthly decline from the like month a year ago, according to figures compiled by the News Print Service Bureau. Canadian mills produced 180,305 tons of newsprint in February, a rise of 5,858 tons or 3.2 per cent over the 174,447 tons in the same month last year. Production by United States mills was 70,805 tons, or 1,597 tons or 2.2 per cent below February, 1934. Mills in both countries produced a total of 251,110 tons in February, an increase of 4,261 tons or 1.7 per cent over last year.

For the first two months of this year, Canadian mills manufactured 382,264 tons of newsprint, compared with 362,821 tons in the same period last year, a rise of 19,443 tons or 5.3 per cent. United States mills produced 151,471 tons, against 156,596 tons last year, a decline of 5,125 tons or 3.2 per cent. Mills in both countries produced 533,735 tons in the two months, a gain of 4,318 tons or 0.8 per cent over the 529,417 tons in the corresponding 1934 period. Shipments from mills in both countries fell 20,773 tons short of equaling February's output, with the result stocks at mills increased to 90,037 tons at the end of February. This is the highest level of stocks since September 30 last year when they amounted to 90,590 tons. Such stocks, however, were only 35 per cent of the month's production.

Paperboard production in the United States reached a high point during January, totaling 266,054 net tons of board of all types, contrasted with 199,940 tons in December last and 230,311 tons in January a year ago, according to the monthly summary issued by the Census Bureau. The January board output was larger than in any month all during 1934, and was, in fact the biggest month's production since August, 1933, when 312,747 tons were produced.

New orders received by board manufacturers during January called for 277,780 tons of board, compared with 201,121 tons in the preceding month, and 218,169 tons in January last year. Unfilled orders held by mills at the end of January were for a total of 80,046 tons, against 65,723 tons a month before. The publication of data on shipments and stocks of board has been discontinued because the trade does not consider these figures of particular significance.

◆ ◆

◆ National Copper Paint Co.

Formation of the National Copper Paint Company, an Illinois corporation, to manufacture and market a newly evolved liquid paint of 98.3 per cent purity, is announced by C. L. Welch, executive vice-president. Headquarters are at 666 Lake Shore Drive, Chicago.

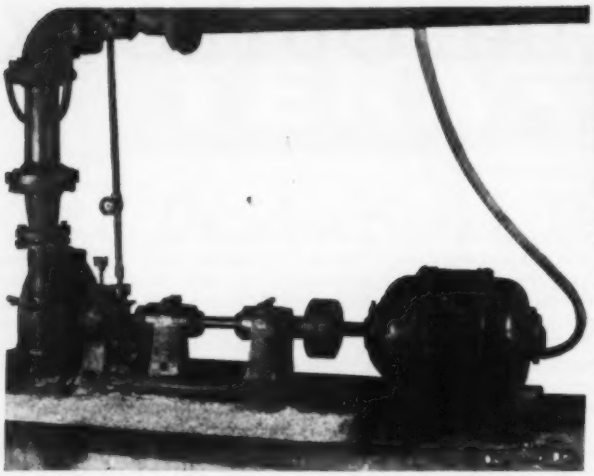
President of the company is H. M. Rice, manager of the Nichols Copper Company, Chicago, a unit of the Phelps-Dodge Corporation.

Three items constitute the line of products for the present. One is liquid copper paint, the second is a liquid copper primer, and the third is a liquid copper reducer to thin out the paint for spraying purposes.

Liquid copper paint is claimed by the manufacturers to be entirely new, and was evolved after eight years of experimentation and some 18 months of severe and comprehensive tests. It is said to contain no linseed oil, fish or any other oils commonly used in paint.

This paint, containing 98.3 per cent pure copper, is rustproof and proof against the ravages of moisture, alkalis and all other deteriorating elements and is also fire resistant. It is applicable to any surface and can be used by virtually every industry.

◆ H. W. DRIGGS, vice president and manager of Tonawanda Boxboards, Inc., Tonawanda, N. Y., passed away April 4.



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BUTTERWORTH *Calender* ROLLS

Domestic RAW MATERIALS

◆ Papermaking Rags

After registering pronounced strength for several months and climbing considerably in price, roofing rags have turned a bit easier marketwise. The principal reason for the change in the market is the retirement, at least for the time being, of most felt paper manufacturers, who apparently feel that supplies of rags should show an appreciable increase now that spring has arrived and larger seasonal collections will be made, and who consequently have withdrawn as buyers.

However, prices of roofing rags have eased but a shade, if at all in some cases in many quarters. Dealers continue to put much stress on the bullish supply condition prevailing. They assert incoming supplies have shown very little or no expansion; that importations are exceedingly light; that it is becoming harder all the while to secure roofing rags in Europe, even at prices well above market levels on this side of the Atlantic, and that it is not at all beyond the realms of probability that should the needs of consuming mills increase a sharp rise in market prices will be witnessed. Also, the belief in numerous parts of the trade is that the Government's home rehabilitation program will lead to this substantial larger business for roofing felt manufacturers, and there is therefore very little pressure to market rags.

In the East, sales of No. 1 domestic roofing rags are reported at 1.30 and 1.35 cents per pound f. o. b. shipping points, and of No. 2 packing at a cent per pound to 1.05 cents. These prices represent recessions of about $1 per ton from the top market levels reached recently. Foreign roofing rags have sold to mills up to 1.65 cents a pound ex dock New York or other Atlantic ports for linsey garments, and 1.25 cents for dark colored cottons. Importers declare it is very difficult for them to get further supplies abroad at costs enabling them to sell to mill customers at these prices.

Fine paper manufacturers are absorbing new cotton cuttings in a fairly consistent manner but in limited volume. Seldom if ever are they purchasing unless having actual needs to cover. Dealers say it is nothing uncommon for mills to place commitments and wire requests for shipments the same day, which is taken as proof that manufacturers are carrying little or no stocks and are acquiring supplies only when pressed by necessity. Quoted prices of cuttings are steady, on most grades at any rate. No. 1 white shirt cuttings are 6 to 6.25 cents per pound f. o. b. dealers' shipping points, 2.25 to 2.50 cents for fancy shirt cuttings, 6.50 cents for unbleached muslins, 4.25 cents for light silesias, 5.50 cents for bleached canton flannels, 1.75 cents for No. 1 washables, 3.25 cents for soft black silesias, and 3.75 cents for blue cheviot and overall cuttings.

Old white cottons are wanted in small parcels in some consuming quarters and prices are maintained and evince a rising tendency. Blue cottons also are selling in a limited way to some paper mills at steady prices.

◆ Old Paper

The recent reduction in sulphite wood pulp prices has resulted in a recession in quoted rates on high grades of waste paper, more particularly white shavings. No. 1 hard white envelope cuttings are reported available at 2.50 to 2.60 cents per pound f. o. b. shipping points, as against sales not long ago at 2.80 cents, while No. 1 hard white shavings are slightly lower at 2 to 2.15 cents a pound at dealers' points, as are No. 1 soft white shavings at 1.60 to 1.75 cents. Old kraft paper is firm and selling freely on a price range of a cent per pound to 1.10 cents, depending on quality of packing, and ledgers and writings are steady in demand and value at around 1.10 cents a pound for all-white and 80 cents per hundred pounds for colored.

Consuming mills are absorbing old books and magazines in moderate tonnage but are granting unchanged prices of $10 a ton to perhaps slightly higher f. o. b. shipping points in the East for No. 1 heavy flat stock. Old corrugated boxes are selling at $8 to $9 a ton in the East, and $10 in the Middle West. Prices of folded news and mixed paper remain low, the former grade selling at $4.50 to $5.50 a ton f. o. b. shipping points in the East and No. 1 mixed paper at $3 per ton.

◆ Rope and Bagging

It would appear that such purchasing of old rope as paper mills are engaging in is of an "under cover" variety, which is to say they are absorbing supplies only from regular supply sources while seldom entering the open market to buy. Prices of old rope are about stationary on a range of 1.75 to 2 cents a pound f. o. b. shipping points for No. 1 domestic old manila, and 1.90 to 2 cents ex dock New York for foreign. Demand for old bagging, on the other hand, is relatively good. Much of the call is emanating from consumers other than paper mills, however. Domestic No. 1 scrap bagging is selling at 1.35 cents a pound at shipping points, and higher in some instances, while imported material is generally quoted above this. Roofing bagging has sold at a cent per pound at shipping points and ex dock Atlantic ports.

◆ Pulpwood

A steady contact movement of pulp wood keeps up but reports tell of limited open-market activity. Most manufacturers apparently are amply supplied and are engaging in scant buying. Quoted prices nevertheless show no change.

◆ Mechanical Pulp

Moderate activity is reported in the mechanical wood pulp market. Consumers are purchasing in guarded fashion; that is, they are mostly keeping out of evidence unless in need of supplies, and even when operating in the market are confining orders to more or less definitely required tonnage. The price situation is fairly steady. It is probable that buyers are now and then getting some groundwood at what might be called shaded prices, but grinders and importers as a rule are not pressing to sell. Canadian prime groundwood is quoted at $23 a ton ex dock New York or other American Atlantic ports for pulp brought down by schooner, or approximately from $26 to $32 a ton delivered consuming mills, depending on the inland freight. The small quantities of domestic groundwood sold in the open market are bringing in the vicinity of $28 to $30 a ton delivered, also depending on the freight haul. Scandinavian groundwood quotations recently have exhibited a softening tendency, and this has been reflected to some degree in domestic and Canadian wood prices although failing to definitely lower them.

◆ Chemical Pulp

The big development in the chemical wood pulp market is the reduction in sulphite prices, recently put into effect —a lowering of the minimum sales basis on bleached sulphite by $5 a ton, and on unbleached sulphite by $4 per ton. These downward readjustments are said to have been regarded by domestic pulp manufacturers as necessary, yet most producers in the United States were not keen to reduce prices to so large an extent, favoring more moderate recessions, though falling in with the proposals of European pulp manufacturers and agreeing to the price cuts promulgated. The new basis on bleached sulphite is 2.50 cents a pound minimum ex dock American Atlantic ports, and on prime unbleached sulphite 1.90 cents ex dock, with prices $2 and $3 to even more above these levels for extra grades of sulphite.

The price reduction has stimulated demand for sulphite to some degree, and the market is a bit livelier. However, consumers in most instances appear well supplied and are purchasing with caution. Domestic bleached soda pulp continues on a price level of 2.50 cents a pound delivered paper mills, and is reported in relatively fair demand. Limited lots of domestic and Canadian prime kraft pulp are bringing around 2 cents a pound delivered consuming points.

◆ Chemicals

Argentine casein prices evince easiness, and the coarse ground product is down to 13 cents a pound ex dock. Domestic quotations hold at 12.50 to 13 cents for the coarse and 13.50 to 14 cents for the fine.

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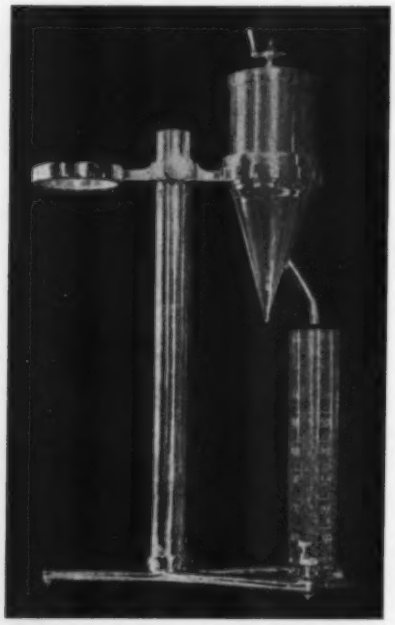

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Import and Export MARKETS

IMPORTS

◆ Wood Pulp

A development of much importance in wood pulp is a reduction, announced on March 18 and effective as of that date on all new business, of $5 per ton in the minimum established price level on bleached sulphite pulp and $4 a ton on unbleached sulphite. The reduction was the outcome of negotiations of several weeks between pulp producers in Europe and Canada, and producers, consumers and importers in the United States. The lowering of prices on sulphite constitutes the first change in the minimum sales prices for the American market in more than a year.

The price decreases bring the minimum basis on bleached sulphite to 2.50 cents per pound ex dock American Atlantic seaboard on both domestic and imported pulp, with slightly higher prices for some extra grades of bleached, and 1.90 to 2.05 cents a pound, depending on grade, on standard prime strong unbleached sulphite, also ex dock Atlantic seaboard. The decline was put into effect by the Sulphite Pulp Suppliers, the producers' organization in Europe, in conjunction with Canadian and United States pulp manufacturers, and the lower sulphite prices are expected to enable converting mills in the United States to compete more favorably with the self-contained paper mills in this country; that is, those mills which manufacture their own pulp. Producers in the United States shared in the view of the S. P. S. members that a reduction in sulphite prices was essential, although favoring smaller reductions than finally decided upon. The lower pulp prices, it is believed, will serve to remove the advantage which self-contained mills have had under the minimum sales bases prevailing during the past year or longer.

The price reduction has stimulated demand for sulphite pulp to some extent, paper manufacturers in certain instances having come into the market and bought on a fairly large scale. Nevertheless, purchasing has continued well below normal volume, as a majority of paper mills are said to have their needs amply covered for a time, and evidently not caring to add to their raw material commitments at present.

Kraft pulp remains unchanged and firm on a minimum price basis of 1.70 cents per pound ex dock Atlantic seaboard. At no time during the negotiations concerning sulphite prices was kraft mentioned, it is stated, as this class of chemical pulp is regarded as on a comparatively low price level, with producing mills well sold ahead and with consumers and producers alike indicating satisfaction with the minimum sales price established. Reports say that many kraft mills in Sweden are fully sold up for the balance of 1935, and as proof of this, instances are cited where importers have cabled over offerings to Sweden and mills there have refused acceptance because of not having the pulp to sell.

Importations of wood pulp into the United States hit the "high spots" during January, arrivals in that month reaching an unusually large total, larger than in any single month all during 1934, and, in fact, above any month's receipts since November, 1933. The large January imports, doubtless reflecting last open water shipments from Scandinavia, amounted to 160,103 long tons of chemical pulp, valued at $6,083,921, according to official U. S. Department of Commerce figures, comparing with 124,347 long tons of a declared value of $5,072,684 in December last, and 124,911 long tons of a value of $4,697,895 in January, 1934. The January imports were nearly 12,000 tons above the largest month's importations in any 1934 month.

The increase in January imports was due largely to the rise in unbleached sulphite and kraft pulp. Unbleached sulphite arrivals totaled 66,322 long tons of a value of $2,417,940; bleached sulphite, 30,059 tons of a value of $1,596,965; unbleached kraft, 57,808 tons of a value of $1,681,972, and bleached sulphate pulp, 5,335 tons of a value of $360,161.

◆ Paper Stock

Following a distinct recovery during 1933 over the preceding year—imports in 1933 almost doubling those of 1932—importations of papermaking rags into the United States declined during the last calendar year to a total of 101,523,797 pounds, valued at $1,282,668, showing a drop of 41 per cent in quantity from the 171,503,795 pounds of a declared value of $1,413,830 in 1933. Compared with other previous years, the 1934 rag imports represented a tremendous decline. For example, the largest imports in any twelvemonth during the past ten years were 572,431,511 pounds in 1925, and the 1934 receipts constituted less than one-fifth of this total. In fact, imports last year, from a volume standpoint, were smaller than the exports of papermaking rags from the United States, Department of Commerce statistics showing that this country exported 107,527,402 pounds of rags and other paper stock, valued at $1,077,559, during 1934.

◆ Paper

Imports of paper and paper products into the United States in January reached a total value of $6,399,259, according to U. S. Department of Commerce reports, showing a fairly sharp decrease from imports of a declared value of $8,307,866 in December last. Newsprint to the amount of 160,973 tons accounted for $5,674,647 of the total of January imports, contrasted with 222,897 tons of a value of $7,582,297 in December. The remaining comprised principally boards, other printing papers and kraft wrapping paper, and cigarette paper. Second to newsprint in the value of receipts were imports of cigarette paper, amounting to 919,738 pounds, valued at $245,426. Imports of newsprint declined 4 per cent in volume and 3 per cent in value compared with the same month in 1934. Of interest in the January, 1935, importations was the heavy increase in receipts of the item classified as leatherboard, test and wallboard.

EXPORTS

Exports of paper and paper products from the United States in January last amounted in value to $1,561,223, compared with $1,520,371 in the month preceding, and $1,500,775 in January, 1934, according to U. S. Department of Commerce figures. The volume of shipments of most items was greater than in the corresponding month last year, although in many instances these increases were accompanied by a decline in average value. Increases were registered in coarse papers and boards rather than fine papers and specialties. Exceptions were surface-coated papers and writing papers, shipments of which increased 46 per cent and 12 per cent, respectively. In the coarse paper and board group, newsprint exports rose 6 per cent in volume over a year ago; wrapping papers, including greaseproof and waterproof, 30 per cent; boxboards 6 per cent, wallboard 10 per cent, and vulcanized fibre 28 per cent.

A greater increase was registered in U. S. shipments of paper base stocks during January. Sulphite pulp exports rose in volume from 9,671 tons last year to 13,732 tons in January this year, and in value from $432,926 to $770,139. Exports of rags and other paper stock declined in quantity from 3,380 tons to 1,700 tons, but rose in value from $54,953 to $59,535. Exports of this group during January totaled in value $867,081, an increase of $369,596, or 74 per cent, compared with the same 1934 month.

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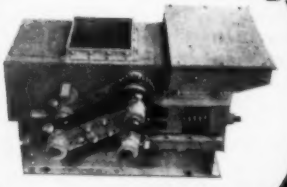

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